University of Alberta

Teaching and Learning through Broadband Videoconferencing

by ©

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Abstract

This study begins with the inspirational account of one school's journey to uncover the possibilities of TeleLearning -a new-age way of teaching and learning through broadband networks and IP-based videoconferencing. Previous studies, along with constructivism and change theories, are used to support the development of new technology-mediated learning environments.

Chapter 4 is a rich description of TeleLearning including images of curriculum-based videoconferences. Chapter 5 brings us to the TeleLearning study. Student and teacher perceptions of this way of teaching and learning are examined. The research results provide useful indicators of how videoconferencing lessons should be designed in order to ensure learner engagement and achievement.

Chapter 6 offers technical details, including infrastructure, and equipment. In Chapter 7, practical, research-based advice informs the successful creation of videoconferencing programs and environments. The natural conclusions to this work are the lessons learned and a look ahead at the future of videoconferencing in education.

Acknowledgment

The personal journey that resulted in the creation of TeleLearning at Edmonton Public Schools, and this thesis, could not have been possible without the support and contributions of many people.

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CHAPTER 1

The Pilot: Introduction to Broadband Videoconferencing

I wish to be a citizen of the world,

not of a single city.

–Desiderius Erasmus, 1523

It was a teacher's dream. Twenty-three diverse high school students were *all* passionately engrossed in a discussion on national unity -and it was only 7:30 am in Edmonton! A topic would arise, the students would huddle for a few moments quickly sharing all that they knew, sometimes debating in excited whispers, but ultimately forming a collective response. Responses were shared but not in the usual method of standing before teacher and classmates. These Alberta students were sharing their knowledge and attitudes on national unity with students in Quebec. They were connected in real time through the use of broadband videoconferencing facilitated at the neighboring University. Through several years of teaching I had never witnessed anything quite like it. Teachers on the sidelines, students taking charge, and the technology seemed to disappear. Moreover, two intriguing observations were witnessed during the event -the first was the dramatic change of attitude in the Alberta students and a second fascination involved the level of student engagement.

Prior to the event, discussion among Alberta students revealed a rather nonchalant consensus that the potential of Quebec separation from Canada was not a big issue. One student remarked, "If they want to go, let them." In the post-event discussion, students expressed a better understanding of the separation issue coupled with a sense of remorse for their earlier statements. The student that issued the earlier quote said, "I'm glad we didn't tell them what we said before … it was before we really knew them or the issues." These students had to be part of the process in order to reach a depth of understanding that would cause such a change in attitude –it's not something that could have come out of a text book.

Although not scientific, it is remarkable that in this three-hour event not a single student asked to go to the bathroom! The students debated a variety of topics from the history of Louis Riel to the promotion of tolerance and understanding, without a break. Topics were debated with passion, questions were addressed and there was a strong reluctance to end the session.

This pilot event produced intriguing research questions. Why were these students so engaged? Was it a one-time phenomenon attributable to all the novel technology? How would teachers respond to this type of teaching and learning? Evidently, the students were keen. Parents thought "this was a great opportunity for their kids;" the teachers wanted to continue this from their own school; University faculty members discussed the potential of this technology to support learning in a number of areas. On his way out of the room, a school board director (my boss) said, "you're on to something here." This is how the adventure in TeleLearning at Edmonton Public Schools began.

The pilot was the easy part. The real challenge involved the creation of a broadband videoconferencing environment to support teaching and learning in a high school. Enter, J. Percy Page High School.

The Study Begins

This study covers the creation and results of the TeleLearning program at J. Percy Page School. The work includes an examination of why this technological exploration is important to education and provides a rich description of videoconferencing sessions across various curricula. The case study research provides student and teacher perceptions of this way of teaching and learning. The research addresses the questions from the pilot (see above) and provides recommendations to ensure a high quality learning experience for teachers and students through the use of broadband videoconferencing. Naturally, the study closes with a look at the future of technology-mediated teaching and learning.

CHAPTER 2

Battle Scars: A Journey from Archaic to Avant-garde

Life is never more rich, more full, or more rewarding
than when you are moving faithfully and persistently
toward a compelling vision.
When you are purposefully creating, you become fully alive
(McNally & Speak, 2004).

This is the story of J. Percy Page High School –a typical Canadian high school that in 1997 was ten years behind in terms of technology. Back then, the school had a dysfunctional mix of Mac's and pc's. Only two computers were connected to the Internet and none of the computers would talk to each other.

The school and community recognized the importance of information and communications technology (ICT) skills to our future knowledge workers. Staff, students and parent council decided to make a serious commitment towards bringing J. Percy Page into the new Millennium with technology programs that support teaching and learning through the use of communications technology because they understood that,

> *there is no part of our world today that is untouched by information and communication technologies. Technology has become a vital component of how we think and what we are able to think about. It has changed how we organize and present our work, and how we communicate with one another…Technology is an integral part of our everyday world.* (Clifford and Friesen, 2001)

There was a strong desire to embed technology skill development within a research-based pedagogical model. One of the enduring difficulties about

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Note: Portions of this chapter have been published (see Andrews & Mitchell, 2003).

technology and education, according to Dr. Martha Stone Wiske, co-director, Educational Technology Center at Harvard, is that a lot of people think about the technology first and the education later (Schacter, 1999). J. Percy Page staff were committed to focusing on the ways to strengthen and deepen learning opportunities for students through information and communication technologies. A team of staff, students, parents and school board officials participated in a highly educational and engaging videoconferencing pilot at the U of A. The pilot confirmed the power of communications technologies to support real-world learning experiences. In addition, newly mandated technology (ICT) outcomes within Alberta curricula were on the horizon. J. Percy Page staff and community wanted to foster these real-world leaning connections and meet the ICT outcomes as well.

Through a consultative process the school developed a five-year plan. "A rush of contagious optimism spread throughout the school as people began to discuss the potential of new technology in supporting student learning," recalls Principal Lou Yaniw, "we were all very excited to write the next chapter of continuous improvement at J. Percy Page." A summary of the 5-year plan is provided below.

A Five Year Plan

The Objectives:

1. Show ingenuity, creativity and leadership in the development of frontier educational initiatives utilizing communications technologies to support teaching and learning;
2. Make J. Percy Page a leader in the use of technology to support teaching and learning by developing partnerships, tools and programs that enhance student achievement;
3. Promote advanced technology and collaboration skill development for both teachers and students;
4. Connect students and teachers to the best learning opportunities that the

world has to offer through the use of advanced networks and communications technologies.

In order to fulfill these objectives, the school developed an action plan to meet each of the following milestones over 5 years (the results are included).

Milestones:

1. Secure Partnerships and Resources (the right partners): The summer of 1998 a partnership was secured between J. Percy Page and Shaw Communications. Shaw provided technology, connectivity and training. Page provided a test bed for Shaw's new Fibreone network technology service. A copy of the partnership model can be found in the Appendix.
2. Provide a Broadband Connection: The first milestone was connecting the school to Canada's advanced research network. Thanks to the partnership program, J. Percy Page was the first K-12 sector member on Canada's CA*Net network.
3. Implement Appropriate Technologies: Parent council and school partners secured required funding to purchase some new computers and projectors. Initially, the school borrowed videoconferencing equipment from several partners including the University of Alberta and vendors.
4. Train Staff: Started with train the trainer sessions for one staff member at the communications centre in Denver, USA (sponsored by Shaw). This staff member then offered a series of technology integration and training sessions to our staff (these sessions were so popular that they were opened to staff from other schools).
5. Develop Programs: Innovative opportunities to connect teachers and students emerged. The Global Classroom - a student centred ICT program funded through CTS credits. It started with 9 students and by the end of year two there were 80 students enrolled. LearnCanada and ABEL were national teacher professional development programs funded through the CANARIE learning program (www.canarie.ca).

6. Expand Staff Training: Advanced training sessions were added and a side-by-side technology mentorship program was established. Staff experimenting with ICT integration had a supportive mentor helping them in the classroom.
7. Integrate Technology School-Wide: Department heads and technology committee members ensured the use of ICT within every area of study.
8. Implement Accredited Professional Development: The school participated in the successful creation and implementation of the Advanced Broadband Enabled Learning (ABEL) Project. This project was accredited by the University of Alberta (M.Ed program).
9. Build a TeleLearning Centre of Excellence: A facility to house the student and teacher TeleLearning programs at J. Percy Page as well as an educational research "sandbox" –including researchers from the Galileo Educational Network (www.gailieo.org).
10. Conduct Research: Have at least 5 staff members working on research projects in collaboration with external researchers (arms-length evaluation).
11. Disseminate Results: Provide staff with opportunities to share their work and experiences/expertise. Mentor other schools. Disseminate the results of research and evaluation;

The plan called for a two-prong approach leveraging broadband networks and associated applications through a program for students and a program for teachers. These "TeleLearning programs" are described briefly below.

The Global Classroom:

Tapping into Canada's high-speed research network (CA*Net) J. Percy Page students and teachers in the Page Global Classroom Program connect, in real time, with peers and experts around the world. Students collaboratively select multi-disciplinary topics, conduct research (using on-line databases and experts), create multi-media presentations and, during scheduled TeleLearning events (broadband videoconferences), students share their knowledge and enter into debates with experts and peers.

J. Percy Page students and teachers participated in broadband videoconferences with their counterparts in the USA, Europe and Canada. Events involved connections to Ottawa, Toronto, and St. John's to debate the Kyoto Accord and connections to policy experts in universities in Canada and the USA to debate Canada's role in the Iraq crisis.

The Page Global Classroom Program represents a significant step in the use of technology to enhance learning. This type of collaborative learning has tremendous implications when it comes to our ability – as a global community – to resolve and avert potential world problems.

The goals of the Global Classroom program are to:

1. Use engaging constructivist learning models coupled with leading edge technologies to enhance student skills, cultural attitudes and knowledge, within a variety of curricular areas.
2. Form collaborative partnerships between students and experts around the globe to bring real-world relevance and authenticity to the curriculum.
3. Develop global employability skills and lifelong learning attitudes in our future workforce.

LearnCanada

J. Percy Page provided instructional design leadership to teachers from 7 school districts across Canada. Teachers collaborated on professional growth activities and students projects using a project-based learning methodology. LearnCanada was funded through the CANARIE learning program (www.learncanada.ca).

ABEL

J. Percy Page provided leadership in the Learning Component of the ABEL project. The Advanced Broadband Enabled Learning (ABEL) Project is a technology-mediated teacher professional development program lead by York University and initially funded through the CANARIE Learning program (www.canarie.ca). Like the Global Classroom and LearnCanada, ABEL engages a new culture for teaching and learning through the use of broadband networks and information communications technology (www.abelearn.ca).

The goals of the ABEL project are to:

1. establish an interactive collaborative learning model for educational delivery and teacher professional development
2. support the dissemination of leading-edge instructional design and educational expertise
3. To develop the basis for sustainable inter-jurisdictional and inter-institutional collaboration in supporting professional development of teachers (ABEL is accredited for graduate programs in Ontario and Alberta)

Examples of ABEL events/training:

- Teaching and learning through inquiry (led by researchers at Galileo Educational Network);
- Using online collaboration tools: Training sessions, such as online course authoring, video streaming, Galileo IO (intelligence online);
- "Subject Series" – teachers in the same subject areas collaborate on how to involve their students in a variety of curriculum projects (math, science, social studies, English and arts/multi-media).

Results!

In 2004, at the end of the 5 years the school met all of the major milestones within the 5-year plan. At a tour of the new TeleLearning centre in 2003, Dr. Buck from the University of Alberta observed that,

> *in defining a clear vision and plan, J. Percy Page transformed their school into a high-performing learning organization responsive to the current and future needs of their staff and students...today, they are clearly leaders in the use of technology to support teaching and learning (Buck, email communication, 2003).*

J. Percy Page is committed to providing teachers and students with access to quality e-learning experiences using networks. Staff and community are fully committed to *The Plan* because it enables the school to better provide educators and students with the skills, information and experience they need to benefit from a knowledge-based society by:

- encouraging students to stay in school by using methods that are synchronous with the new- age learner;
- expanding technical expertise and training;
- raising awareness of the role each stakeholder plays in enhancing the quality of learning;
- fostering and promoting:
    - online literacy;
    - the acquisition of employability skills by integrating in-class and on-the-job workplace experience;
    - information and communications technology skills in Canadian schools and communities.

The J. Percy Page five year plan was fulfilled because of the combined commitment and involvement of staff, students and community. All of these stakeholders were involved every step of the way, from partnership/program creation and implementation to research and evaluation.

The staff, students and school partners took full advantage of new broadband technologies to develop innovative programs like the Global Classroom, LearnCanada and ABEL. The comments below reveal a compelling rationale for continued exploration of this way of teaching and learning.

> *"The opportunity for PD outside of our own district is incredibly important for teachers to get a broader perspective of trends in Canada and how they are reflected in the programs in the schools. As teachers of the arts, we often do not have the support, and connections regarding resources, to broaden our curriculum beyond the local perspective."*
> *(teacher comments from interview, May 2003)*

> *The fostering of a global-community perspective, through broadband TeleLearning Events that connect Canadian and international students, is creating successful and open-minded students. Ultimately, all Canadians will benefit when the society of the future is shaped and lead by those students who have evolved into successful, open-minded community- and world-citizens.*
> *(Park, Vice President of Shaw Communications, comments from interview in May 2003)*

> *"Seeing and hearing the students we are learning with, creates a special bond that cannot be created over e-mail or message boards. In the videoconferences we are able to get rid of the*

single-minded viewpoints that we often hold about society and open our minds to the ideas and viewpoints of the rest of the world. While talking about global issues, we get a global viewpoint, which is essential to eliminating discrimination and alienation."

(Global Classroom Student, comments from interview in May 2003)

"In the future, I would like many more schools to join in on broadband video conferencing around the world, so that we can acquire greater, first hand knowledge of the way that our planet works, and the people we share it with.

(Global Classroom Student, comments from interview in May 2003)

TeleLearning Centre Opening
J. Percy Page High School

Figure 2.1 – Grand opening of the TeleLearning Centre at J. Percy Page

Today, J. Percy Page is a national leader in the use of advanced technology to support teaching and learning. As a result of their pioneering efforts the school has won several awards for innovative teaching. These awards include two SMART City awards for SMART partnerships and educational vision and two Network of Innovative Schools awards. With the addition of the new TeleLearning Centre, staff and students at J. Percy Page will continue to develop and research new technology-mediated models for teacher professional development and educational delivery for students.

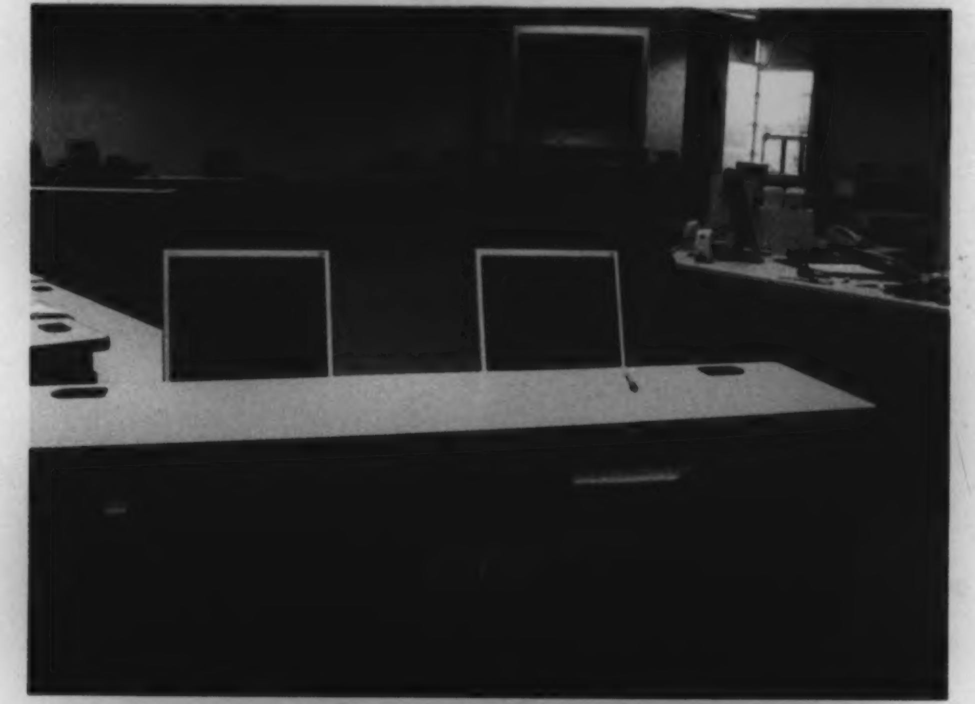

Figure 2.2 - Images of the Global Classroom in the New TeleLearning Centre

Figure 2.3 - Atrium of the New TeleLearning Centre

CHAPTER 3

The Emergence of a Crack: The Pedagogical Possibilities of Videoconferencing

There is a crack in everything,
That's how the light gets in.
-Leonard Cohen

Introduction

Thankfully, there are truly innovative and successful educators, schools and programs within the larger picture of our educational system. These pockets of innovation represent hopeful rays to be examined, nurtured, supported and disseminated. Educational innovation is on the rise, presently, however, it remains the exception.

Most envision the typical classroom as desks in neat orderly rows, teacher writing on the white board at the front of the class, students taking notes with text book open. The classroom is often characterized by independent sit-still work and some other activities (hands-on, group work, computer lab time).

Educators and critics of education share a sense that there is something "not right" in the current system of education. The current system is largely the traditional system –developed in the late1800s (Cuban, 1982, Broudy, 1982). Our educational system is a "resilient and remarkably invulnerable institution [which] has been structured in much the same way

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Note: Portions of this chapter have been published (see Andrews & Marshall, 2000).

since the turn of the century" (Cuban, 1982, p 113). Despite unprecedented societal and technological developments, our educational system remains fixed and impermeable. It is "not right" that education has not adapted to meet the issues and realities of this New World. Blades (2000) emphasizes that education must respond to changes by creating a new curriculum for the 21st century, because, in the new century technological change will force us to rethink what it means to educate the next generation of citizens. It is apparent that we need to explore new ways of teaching and learning. We need to explore new and innovative opportunities that create cracks in this fixed and impermeable system. These cracks provide pedagogical opportunities.

This chapter examines TeleLearning or collaborative videoconferencing as an example of an opportunity for pedagogical innovation. To understand both method and potential of TeleLearning, we will experience a collaborative videoconferencing session and discuss the implications of this way of teaching and learning.

A Collaborative Videoconferencing Experience

The students fidget nervously while scanning their last-minute notes and offering tension-filled glances or comments toward each other. Their teacher provides some final tips, smiles and asks "so…are we ready?"

Suddenly, the students look up as four smaller screens or "boxes" appear on large over-head screen, covering most of the world map that had been displayed. Each of the boxes shows a group of high school students –all of them smiling nervously or giving a quick wave. The first box has a multicultural mix of at least 30 students sitting in an automotives shop within a central Toronto high school. Another box shows a group of students, as well as guest speakers, sitting in a techno-haven at the

Communications Research Centre (CRC) in Ottawa. The third box has a group of students sitting in an office at Memorial University in St. Johns'. The last box is our image –20 students sitting in a library classroom at a High School in Edmonton, Alberta.

This is a very different learning environment. No teachers are "on stage" – only students. The teacher/facilitator and coordinator are on the sidelines. The rows of desks, blackboards, textbooks and binders have been replaced with movable seating, a large screen, a computer projection device, a computer, a camera and a microphone. The class begins.

The students, in turn, introduce themselves. It is our turn to lead the group. A student, we will call her "

'Amy' turns on the microphone and says, "We are pleased to present the topic of Technology vs. Personal Privacy and Safety. Our group has created a video that demonstrates how your personal privacy and safety can be at risk due to advances in technology." She waits, for what seems like an eternity, for the video to begin. It does, but unfortunately it's going too fast: the screen is streaked and the sound is garbled.

The group begins to panic and turns to their teacher/facilitator. With a gentle reminder that they are armed with hours of research, she suggests that the students teach both sides of the issue without the video. They agree and do some quick brainstorming. Back on-line, 'Amy' and 'Gloria' summarize both sides of the issue (with the help of other group members) and close with some leading questions.

For the next hour, these student groups from across Canada debate a variety of issues within this theme. Toronto students attempt to convince the other groups that the practice of capturing IP (Internet Protocol) addresses (when people visit sites on the Internet) and then sending them advertising is a form of spying. Our students point out several ways that your personal information can be obtained through the Internet. They discuss ways we can protect ourselves. Finally, our clever technician manages to fix the video problem and our presentation closes with a fantastic multimedia presentation, created entirely by students.

An educational researcher from the University of Quebec appears on-screen and asks the students to comment on the opening session. Their comments are very insightful –"There were many different points of view that our group never came up with," "We didn't know about IP tracing and some of the other safety issues regarding the Internet," "This is a great way to learn –from each other."

After a break, our pan-Canadian classroom resumes with a presentation by our Telementor Mike Beedel, explorer and renowned photographer. Mike's presentation on the plight of the Spirit Bear, in British Columbia, contains breathtaking images and thought provoking narrations by author Pamela Coulston (also present). Students, from each region, eagerly ask questions about the elusive bear and its threatened habitat. The students decide to express their concern through letters and emails to the government officials involved. Mr. Beedel provides the necessary coordinates on a white board that appears on everyone's screen.

Once again, the session concludes with an evaluation led by the Quebec researcher. It is noon and the students say good-bye. After lunch they will attend traditional classes.

With the students gone, the educators discuss, on-line, a variety of topics including the high caliber of student presentations and ways to expand the program. The educators agree that this would be a good opportunity for teachers to collaborate and share teaching practice or discuss educational issues.

On the second day, our students seem more relaxed. The four boxes pop up on the screen. We are joined by the CRC group and Newfoundland students from yesterday, as well as a new group of Grade 8 students from Quebec. The Grade 8 students explain the geological formation of the region where they live. Their presentation is done in both French and English and includes a slide show of scientific diagrams and photographic images. One of the young presenters uses the computer application's drawing tool to draw a circle (with a cartoon crayon that appears on everyone's screen) around the area that was being described. Questions and answers close this session and the evaluation begins, again. The students, apparently, are impressed by this presentation and give the presenters positive feedback. One of our students says how much he appreciates hearing the information in both languages –as a secluded Francophone Canadian this was quite important to him and his discussion leads nicely into the next topic.

Next up is *World Conflict due to Cultural Differences* -an oral presentation by the students from Newfoundland. The speaker is difficult to hear (soft voice and some sound trouble), our students who are straining to hear, look to each other for suggestions. Using hand signals, off camera, 'Amy' indicates that she would like something to write with. Instantly, an idea is born! Their teacher appears with a flip chart and some markers. Instinctively the student operating the camera moves the image off of 'Amy'. She takes a marker and starts writing the main ideas of the presentation on the flip chart. This simple addition helps a great deal, now everyone can follow along.

'Amy' wants to participate in the discussion and as she sits down 'Ricky' takes over at the flip chart, and begins to post the idea sheets on the wall. This session's tone is quite dark, as students discuss the ugly side of humanity and images of war fill the screen. The discussion turns to solutions and many suggestions, from tolerance education, humanitarian efforts like Doctors without boarders (MSF), to UN intervention, are debated. In the evaluation segment the students conclude that facilitating on-going national and international dialog through communications technologies, like this event, would be a good start to resolving world conflict.

Once again, it's our turn to facilitate and our student-selected topic is Genetic Technologies. Our students created another video. It works and it is so professionally done that some students suggest that it could be used as a TV commercial, to raise awareness on this critical issue. A few teachers ask for copies to show their classes. The video has a series of images and some thought provoking statements. A very active debate ensues. Some students argue that Genetic Technologies are a Pandora's box that should remain closed, that we should celebrate our genetic variety. A student on the other end of the country (and the issue) says "tell that to the parents of a child with a devastating disease that may have been prevented through genetic technologies." The issue is debated from several different angles until we run out of time. Each location gives their final statement and we move on to the session evaluation. It is obvious to all participants that this is a critical issue with grave implications to the future of humanity.

Everyone agreed that the students involved feel strongly about the developments in Genetic Technologies, and that they debated with great passion. No one wants to end, students keep indicating that they wish to continue; however, it is now past noon. Each location gives their suggestions for the future and their good byes. Once again, the educators (and some technicians) stay on the line to discuss possible improvements and future projects. The group decides that our next TeleLearning conference will be a pan-Canadian session for high school teachers.

Teachers from Newfoundland point out that teaching these complex issues requires the development of compelling new curriculum –this is something that can be developed in future TeleLearning sessions.

Curriculum Fit

The cross-curricular Global Classroom Program supports and enhances a variety of subject areas while meeting the technology-related outcomes within the Career and Technology Studies (CTS) modules. For example, the Global Classroom students conducted research, delivered presentations and debated *The Global Water Crisis* with students across Canada. This activity fit the curriculum within Science 10 *the Properties of Water Unit*, within the *Ecology Unit* in Biology 20 and curricular areas of Social Studies such as globalization, environmental studies and current events. In order to meet the CTS requirements, students complete selected modules (some student selected and some teacher selected). There is a range of modules that include topics concerning: coordinating a conference, advanced communications, desktop publishing, presentation applications, design and creation of a website, etc.

Limitations

This application is critically dependent upon broadband network connectivity. Broadband is emergent, however, it is currently not available to all schools and in all countries. For the schools that are connected by high-speed networks, videoconferencing provides a real-time connection to other cultures, resources and global experiences.

Implications: Education in the New World

As we enter a new millennium, the tools provided by new communications technologies bring a new dimension to the world of education. Information communications technology (or ICT) brings a broad array of new techniques for organizing, creating, communicating and disseminating information. More importantly, however, this technology can bring into the classroom opportunities for a richer *lived* curriculum. Through the use of Collaborative TeleLearning, it is possible for communities of learners to interchange ideas, expertise and culture with their peers anywhere on the globe. Providing learners with the opportunity to experience new ideas and new cultures, even virtually, brings the curriculum to life. A lived curriculum is a curriculum rich in critical dialog and debate with diverse perspectives; a process that facilitates deeper level thinking and actions.

Facilitating dialog and debate between geographically distributed learning communities necessitates the development of compelling new pedagogy. According to Giroux (1985), it is critical to our future that we use "forms of pedagogy that treat students as critical agents; make knowledge problematic; utilize critical and affirming dialog; and make the case for struggling for a qualitatively better world for all people" (p. 378). This is the type of pedagogy that is embraced within TeleLearning programs. Collaborative videoconferencing, places the learners, and the learning, in a real world context. Although this is a technologically created environment, it provides a real world context through synchronous connection to other students/mentors/experts/cultures. It is this synchronous or real-time connection to other people that makes learning exciting.

Most educators have experienced the fact that the knowledge gained by students is directly proportional to their level of engagement. As educators, we must pursue, adjust and adapt to innovative learning opportunities that engage our students. Collaborative learning sessions, that cross continents and time zones, are engaging to the participants. Furthermore, they demonstrate the possibilities of a world without barriers. Using technology to remove the barriers of space and time, provides learners with access to the wealth of learning opportunities that the world has to offer.

Conclusion

Educators, and others, often have a "sense" that something is not right with the current way that we deliver education. Perhaps this is because we are using a 19th century model in the 21st century. Blades (1999) explains that despite what we know about learning and education, despite the vast information from educational research in the 20th century, we still teach a curriculum that, in many cases, is no longer relevant to the social order or the issues our children will face. TeleLearning is a crack in a fixed and impermeable system –it is an opportunity to develop compelling new pedagogy for the 21st century. Through videoconferencing technology, we can facilitate important dialogs that will be played out in these students' futures; dialogs that promote critical and innovative thinking. It is a collaborative model of learning that uses advanced technology to create a deeper level of learner awareness through real-world experiences.

CHAPTER 4

Descriptions of Videoconferencing Sessions and Activities

> *A single conversation across the table with a wise man is better then ten years mere study of books.* –*Henry Wadsworth Longfellow*

This chapter surveys a range of classroom videoconferencing sessions held at J. Percy Page School. The review covers 15 activities that were included in the research (Chapter 5) and in the accompanying TeleLearning video (Appendix). The school hosted between 50 and 100 videoconferences per year, including classroom curricular events, team teaching, professional growth programs and presentations at conferences. The fifteen videoconferencing sessions that were observed/recorded are listed and subsequently described below.

List of Videoconferencing Activities:

1. Science (Grade 6): The Truth about Mars
2. Social Studies (Grade 7): Structures in Space
3. Social Studies (Grades 9 and 10): Woman of Islam
4. Social Studies (Grades 9, 10 and 11) and Global Classroom (Grade 11): The Kyoto Protocol
5. Global Classroom (Grades 10, 11 and 12) and Career and Life Management (CALM 20): Safe and Caring Schools
6. Legal Studies (Grades 10 and 11): Mock Trials
7. Legal Studies (Grade 11): The Case of the Harvard Mouse
8. Legal Studies (Grade 11): The Legal Implications of 9/11
9. Music (Grade 11): Musical Exchange Across Canada
10. Music (Grade 11): Musical Exchange Between Canada and Hong Kong
11. Social Studies (Grades 11 and 12): Drums of War: The Iraq Crisis
12. Global Classroom (Grades 11 and 12): Genetic Technologies Debate
13. Global Classroom (Grades 11 and 12): Global Water Crisis
14. Global Classroom (Grades 11 and 12): Canada's Unprotected Northwest Passage (Discussion with MP)
15. Math (Grade 12): Math Improv

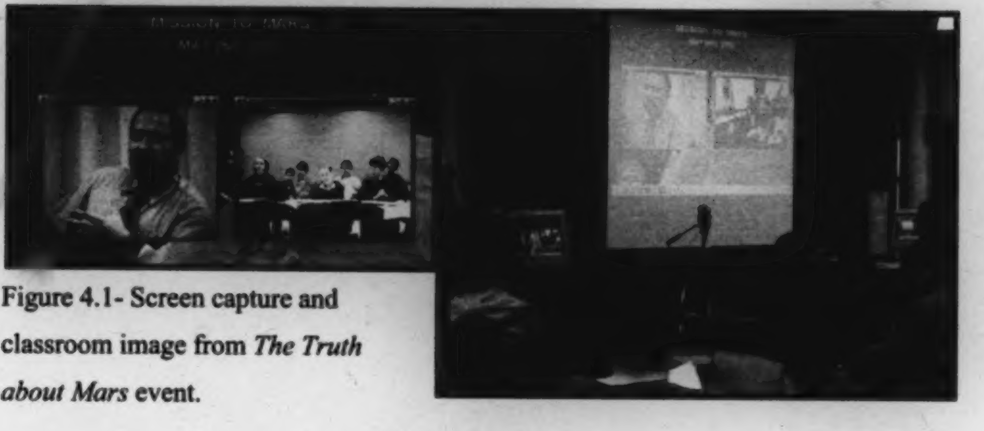


Figure 4.1- Screen capture and classroom image from *The Truth about Mars* event.

1. Science (Grade 6): The Truth about Mars

This point-to-point videoconference involved grade 6 science students from Edmonton and Ontario and a Mars expert [the Project Manager for the Colonization of Mars] from the Canadian Space Agency. The expert participated from the Communications Research Centre (CRC) in Ottawa. Edmonton students were seated theatre-style in a videoconferencing classroom within the library. Students moved to tables in the library for group work. The expert's image, video clips and PowerPoint were displayed on a large screen. The space expert had a grade 6 science class with him in Ottawa. A microphone was passed around to allow students to ask questions and respond to the speaker.

The Mars expert shared "never-seen-before" images of the planet Mars –including the artifacts that cause some to believe that there is life on Mars. After a highly engaging, and interactive 45 minute presentation, the students broke into small groups out in the library and participated in brainstorming sessions around a series of questions about the possibility of life on Mars. Thoughts were recorded on flip chart paper and brought back into the videoconferencing room. Student from both sites took turns sharing their ideas. The space expert responded to each presentation –often referring back to the images of Mars. The brainstorming and sharing session took 40 minutes leaving the last 20 minutes for general questions about space and an excellent summary, by the expert, of all the new things that were learned during the session.

2. Science (Grade 7): Structures in Space

Students from seven sites across Canada joined Canadian Astronaut Steve MacLean to learn about Structures in Space in this innovative and exciting multi-point learning activity. The event was profiled as "the biggest science class in Canada" with over 600 student participants. The session was bilingual with English presentations from students in Newfoundland, Ontario and Alberta and French presentations from students in Quebec and Nunavut.

To start the event, each school presented the results of their research and class work related to a series of pre-event inquiries on structures. Astronaut Steve MacLean provided feedback to each group and presented actual images and results of the impact of space on various structures. He then challenged each site to create the best structure that would support the greatest mass using only straws and string.

A "roving" camera at each site gave the astronaut the opportunity to provide feedback to each group as they planned and created their structures. When time was up each site tested their structures and presented the top model to Dr. MacLean for critique. Lastly, the astronaut used the student structures to illustrate how the students were able to incorporate the structural lessons from space exploration within their structures.

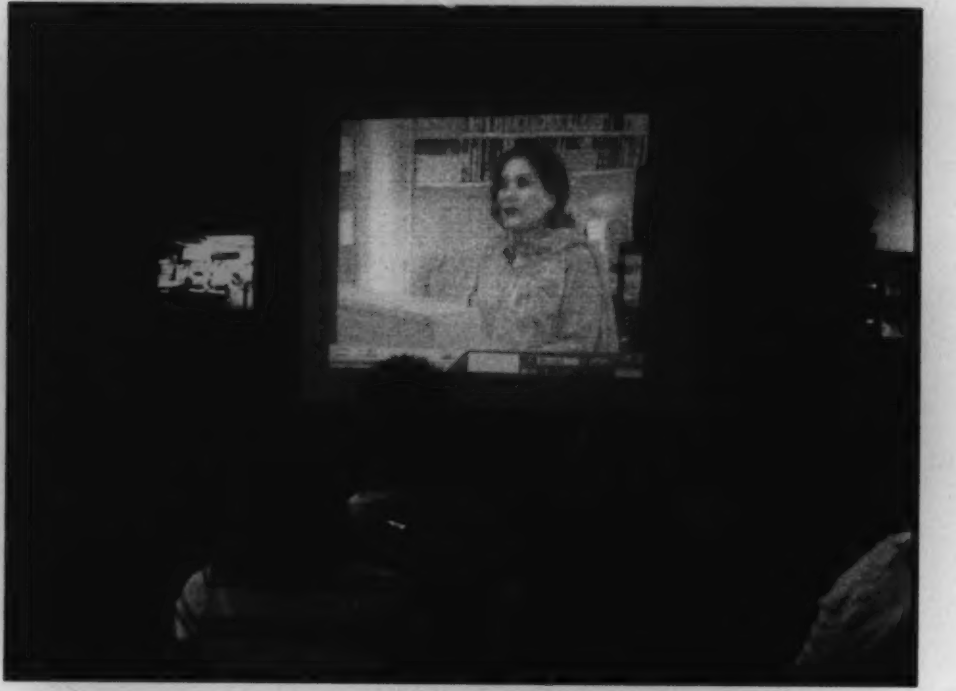


Figure 4.2 - Students learn about the Woman of Islam

3. Social Studies (Grades 9 and 10): Women of Islam

Students from Edmonton and Toronto participated in a presentation and discussion with an expert from the Islamic Society. The lively discussion exposed common myths and misperceptions about Islamic woman and Islamic society in general. Students at both sites took turns asking many highly critical questions and listening to responses from the expert and from their peers.

Figure 4.3 - Side computer monitor displaying The Kyoto Protocol event

4. Social Studies (Grades 9, 10 and 11) and Global Classroom (Grade 11): The Kyoto Protocol

The 123 local participants in this event included staff and students from the Global Classroom, two Social Studies classes, a collection of students and teachers from Junior High Schools and special guests. The remote site, in Ontario, hosted around 80 high school students and teachers and a number of special guests.

The experts represented both Federal and Provincial Governments. These officials were directly involved in the Kyoto Protocol issue. The experts were physically with the students at the school sites in their respective province. The focus of the discussion was an examination of the Kyoto Protocol and its effects on the environment, economy and industry. The debate was lively due to the fact that participants in Ontario were in support of the Protocol whereas Alberta participants were highly critical. The Alberta expert, Dr. Roger Palmer, did an exceptional job of mediation when he was suddenly thrust in the middle of a heated debate between students from Alberta and Ontario. The discourse was initiated by an Ontario student's claim that Alberta was mostly responsible for Canada's greenhouse gasses.

Figure 4.4 - *Safe and Caring Schools* videoconference with speakers at 4 sites

5. Global Classroom (Grades 10, 11, 12) and Career and Life Management (CALM 20): Safe and Caring Schools

Participants in this public event included students from Edmonton and Toronto (via videoconference from their schools), the Alberta Minister of Children and Family Services (with the Edmonton students) and Reverend Dale Lang by videoconference from the University of Lethbridge. Participants were noticeably moved as Reverend Lang shared the tragic events that led to the shooting death of his son at a rural school in southern Alberta. The event progressed from round table presentations to open discussion. Finally, the experts and students collaborated on actions plans to foster safe and caring schools. The plans included anti-bullying programs/policies and early intervention for high-risk students.

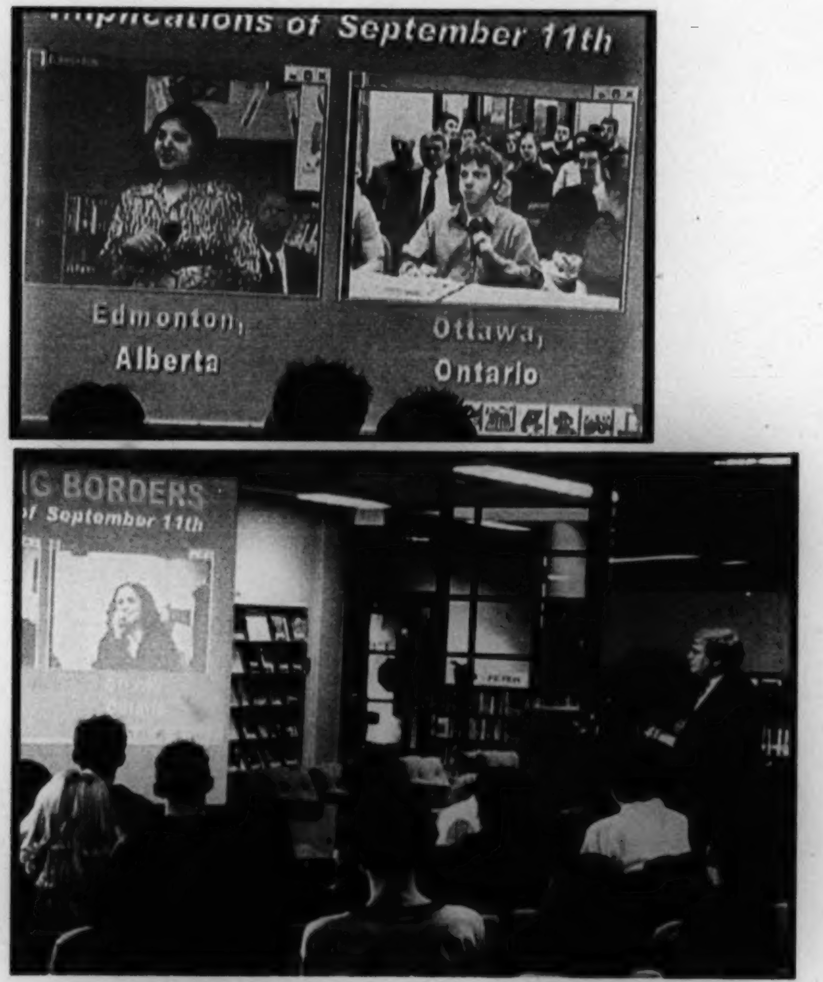
Figure 4.5- Screen (showing Judge and student jury) and classroom (showing student defense team) in a Mock Trial session

6. Legal Studies (Grade 11): Mock Trials

The Mock Trials were a series of highly convincing re-enactments of factual court cases. Students from Toronto or Ottawa would connect to students from Edmonton by videoconference to select a case and discuss the background of the case, relevant legal precedents and the parameters of the mock trial. An appropriate expert from the court system would be invited to officiate the proceedings. The sites flipped a coin to decide which school would play defense and which would be the prosecution. The students all assumed roles as part of the legal team, witnesses, officials and jury. On the day of the Mock Trial, students dressed in part and were very well prepared to argue and deliberate according to their role. The experts involved took the proceedings very seriously and provided historical context and final evaluation of the Mock Trial.

7. Legal Studies (Grade 11): The Case of the Harvard Mouse

Legal Studies students from J. Percy Page connected with schools in Ontario to discuss an important patent case, the case of the "Harvard Mouse". The Supreme Court of Canada ruled the genetically modified mouse cannot be patented. The court said that the mouse does not qualify as an invention under the federal Patent Act of 1869. Students had the opportunity to interact with Michelle Swenarchuk, the lawyer for Canada in the case, who argued that higher life forms cannot be patented.


plications of September 11th
Edmonton, Alberta
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of September 11th

Figure 4.6 - Students from Alberta and Ontario discuss anti-terrorism legislation with the Minister of Justice

8. Legal Studies (Grade 11): The Legal Implications of 9/11

This event was created to help students understand the legal processes involved in the creation of new anti-terrorism legislation, post-9/11, in the fall of 2001. In the videoconference, students debated the balance between individual rights and freedoms and the need for collective security in Canada. Students and had the opportunity to discuss the topic with peers in Ontario as well as with Alberta's Justice Minister, the Honourable Dave Hancock. In addition, students shared multimedia presentations to highlight their point of view. Students from both provinces expressed their concerns regarding racial profiling, and loss of personal freedoms.

9. Music (Grade 11): Music across Canada

High school music students from Newfoundland, Ontario and Alberta worked with a Toronto composer to create and perform a unique piece of music that represented each part of Canada. This challenging and highly theoretical project required several videoconferences to create and modify and perform the piece of music. Students used a combination of regular band instruments and home-made instruments to generate sounds that reflected the unique nature of each province. The project required a lot of collaboration between the music teachers. For example, the music teacher from Newfoundland tuned the Edmonton orchestra and the teachers would often work with each other's students by videoconference. The culminating event was a Musical Showcase featuring the exchange of music from each province and the final performance of the original work played flawlessly by the students at all of the sites.

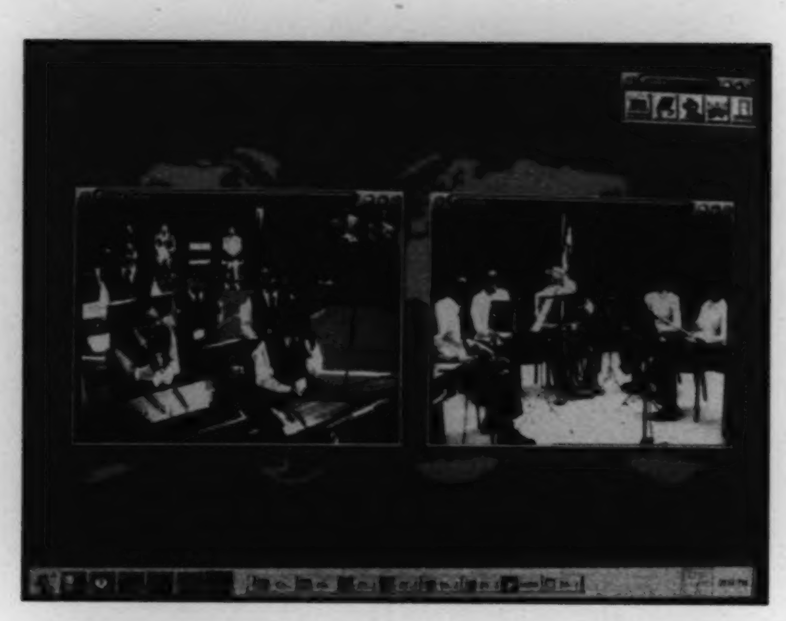


Figure 4.7 - Screen capture of students from Hong Kong and Canada participating in a Musical exchange

10. Music (Grade 11): Musical Exchange between Canada and Hong Kong

Three high school music classes (one each) from Ontario, Alberta and Hong Kong participated in a sharing of music and culture. Students discussed and demonstrated their diverse instruments and took turns performing a number of pieces for each other. The session concluded with a questions and answer session. The Hong Kong students performed in an outdoor court yard on a bright sunny morning. For the Canadian classes, it was 7 pm on a very cold February evening.

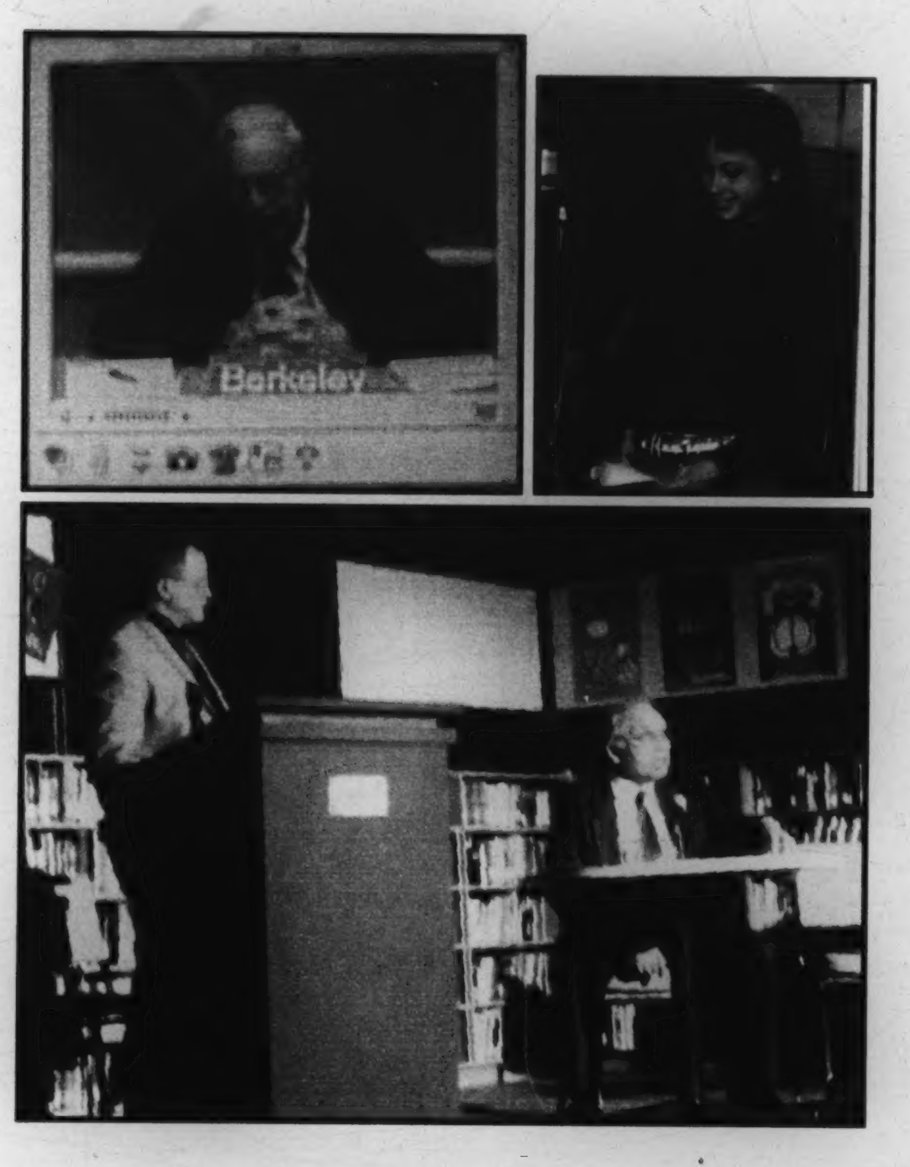


Figure 4.8 - Experts from Canada and the United States debate the invasion of Iraq with high school students in Alberta

11. Social Studies (Grades 11 and 12): Drums of War: The Iraq Crisis

The United States was lobbing the Canadian government for support as the US prepared to invade Iraq. Students from Edmonton connected, by point-to-point videoconference, to an American expert on Canadian policy from Berkeley

University, in California. The expert believed that Canadian youth were in support of the war in Iraq and that it was imperative that Canada join the American military efforts. A Canadian political science expert from the University of Alberta was also in the room with the Edmonton Students. The Canadian political scientist held the opposing view to that of the American counterpart and did not support the invasion of Iraq by the US. Each expert presented their side of the issue, debated several points and took questions from the students. This lively and often heated debate was moderated by a political columnist from the local newspaper in Edmonton. Comments and reactions from participating students were respectfully non-supportive of the American expert's position.

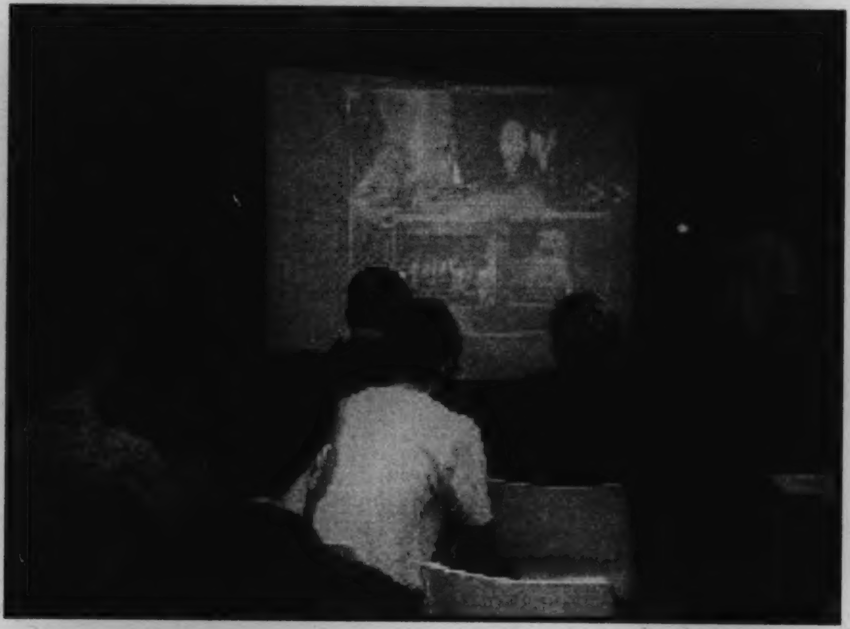


Figure 4.9 - Global Classroom students debate the ethics of genetic technologies

12. Global Classroom (Grades 11 and 12): Genetic Technologies Debate

Several teachers from Ontario and Alberta participated in a professional development project with a focus on the teaching of complex ethical issues. The teachers collaborated on the instructional design and implementation of a joint classroom project to explore horizon technologies. The classes each came up with a horizon technology topic to research and present. In addition, the expert that had worked with the teachers during the professional development program was brought in to work with the students. During the final videoconference, student groups from each site presented both sides of their issue in multimedia presentations and then participated in a debate.

Students from J. Percy Page selected, researched, presented, and led a debate, on the topic of Genetic Technologies. Their session covered subtopics including the controversy over stem cell research, organ harvesting, genetically modified foods and reproductive genetic screening. During the interactive videoconference, students kept track of important debate points on flip chart paper that was then posted around the room. The event was managed and led by the participating students.

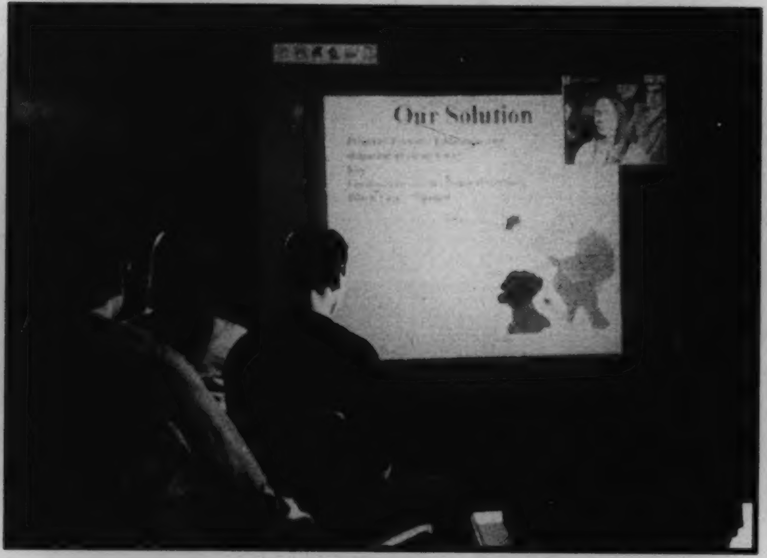


Figure 4.10 - Students share their solution to the global water crisis

13. Global Classroom (Grades 11 and 12): Global Water Crisis

The Communications Research Centre (CRC) in Ottawa developed and facilitated this event for high school students across Canada. Students from Newfoundland, Ontario, Quebec and Alberta received a package of materials to help them create a solution to a global water crisis scenario. Factious names and geographical facts were used to represent various countries. After a brief recount of the scenario, each site presented their solution and took questions. The pros and cons of each solution were debated at length prior to the closing discussion by comparing the solutions to actual world events.

Figure 4.11 - Students share their concerns with a Member of Parliament

14. Global Classroom (Grades 11 and 12): Canada's Unprotected Northwest Passage: Discussion with MP

Global Classroom students became part of the democratic process when they discovered that Canada's Northwest Passage is an open thoroughfare for illegal activity and wanted to do something about it. Students researched the issue and found that Canada's northwest is a popular hub for drug smugglers and environmental polluters due to the lack of controls and law enforcement. In a videoconference with their Member of Parliament (MP) in Ottawa, students shared their concerns. The MP demonstrated genuine concern (took notes, asked questions and requested copies of research documents) and explained to the class the process of bringing forth an issue and having it become policy within the federal government.

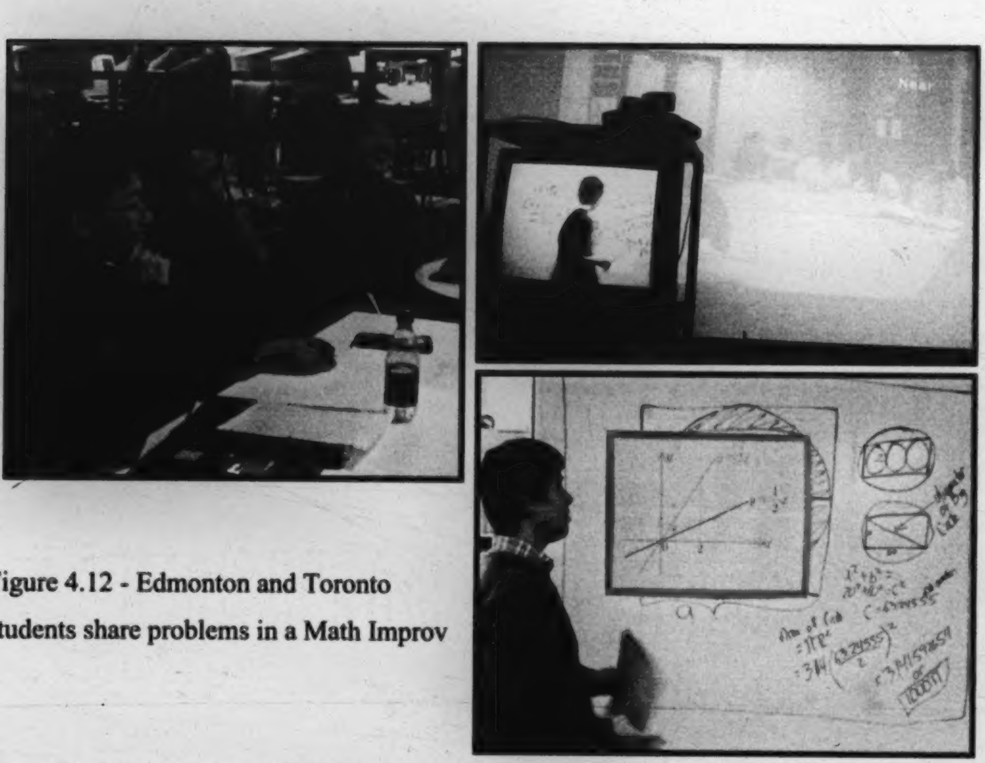


Figure 4.12 - Edmonton and Toronto students share problems in a Math Improv

15. Math (Grade 12): Math Improv

Math Improv involved a series of 4-point (multi-point) videoconferencing sessions every 6 weeks between high school Math classes in Edmonton and Toronto and experts from the University of Calgary and Seneca College. In these energetic sessions, students from one site would present a challenging real-world math problem that they created. The second site would then proceed to try to solve the problem. The experts provided helpful tips and clarifications and validated the final answer. Then the second site presented their challenging problem for the partner site to attempt and the process continued. Everyone cheered as sites resolved each problem. Often students and experts discovered that there was more then one way to approach and resolve each mathematical problem –this resulted in some high-level mathematical conversations between participants. The sessions were almost entirely student directed. The participants created a web site where they could share resources, continue discussions and post additional questions.

CHAPTER 5

Teacher and Student Perceptions of Learning through Videoconferencing

Introduction

This research was designed to capture teacher and student perceptions regarding the use of broadband videoconferencing technology to support teaching and learning. A case study research methodology was used to provide a rich description of the videoconferencing experiences as reported by participants. The contributors were 20 educators and 204 grade 6 to 12 students that participated in expert or peer-to-peer videoconferencing sessions over a two and a half year period. These curricular enhancement sessions were comprised of participants interacting with content experts (another teacher or expert in the field), learning with peers (connected classrooms) or a combination that included both peers and experts. The sessions included participants from two distributed sites (point-to-point) or included three to five sites (in a multi-point videoconference). These videoconferences were instructionally designed to support a portion of the curriculum. None of the examples cited in the research study involved delivery of the entire course by videoconference. The research findings, however, apply to full-course delivery, curriculum support as well as adult learning sessions that use videoconferencing.

The research is divided into four sections. The sections are:

1. Participants
2. Methodology
3. Student Perceptions of Learning through the use of Videoconferencing
    a. Student Evaluation of the Videoconferencing Learning Experience from a Non-Technical Perspective
    b. Student Perception of the Impact of the use of Videoconferencing on Achievement

    c. Student Perceptions of the Videoconferencing Learning Experience Compared to Traditional Approaches
    d. Student Interest in Continuing to Learn through Videoconferencing
    e. Student Perceptions of the Relevance of this Learning Method to their Future
    f. Student Evaluation of the Videoconferencing Technology

4. Teacher Perceptions of Learning through her use of Videoconferencing
    a. Teacher Evaluation of the Videoconferencing Learning Experience from a Non-Technical Perspective
    b. Teacher Perception of the Impact of the use of Videoconferencing on Achievement
    c. Teacher Perception of the Videoconferencing Learning Experience Compared to Traditional Approaches
    d. Teacher Interest in Continuing to Learn through Videoconferencing
    e. Teacher Evaluation of the Videoconferencing Technology

Participants

Two hundred and four students out of a possible 220 participated in the research. Sixteen students were either absent for the research data collection or did not return their signed consent form and therefore could not participate in the research study. The students were from a low to mid socioeconomic, highly multicultural region within a large urban school district. Academic ability/levels ranged from students with learning disabilities (8%) to students within an Academic Challenge enrichment program (10%). The majority of students (82 %) were in regular grade 6, 9, 10, 11 and 12 classes. Almost half of the student participants (48%) had participated in more then one videoconferencing event. The remaining (52%) students participated in one subject-specific videoconference just prior to the research survey and interview.

All 20 invited educators participated in the research. The educators were classroom teachers of student participants or teacher observers within the same subject area. The teachers involved taught a variety of grade levels (6, 9, 10, 11, 12) and subject areas (Math, Science, Humanities, Arts). These educators also had a variety of technical skill levels; 3% had *Advanced* technology skills (web publishing, computer/network configuration); 67% were *Moderately Skilled* (could run a wide variety of applications); 29 % reported *Basic Skills* (email/Internet and word processing); 1% said they had *Minimal* technology skills (less then Basic Skills).

Participants were from the following subject areas:

- Math: 18 students, 1 teacher
- Social Studies: 65 students, 8 teachers
- Global Classroom (a Career and Technology Studies option): 29 students, 2 teachers
- Career and Life Management (CALM): 9 Students, 1 teacher
- Music: 6 students, 2 teachers
- Legal Studies: 39 students, 2 teachers
- Science: 38 students, 4 teachers

Methodology

The case study model (following the design of Robert Stake) was used to capture a rich description of each videoconferencing session as experienced by the participating teachers and students. Participant thoughts and ideas were documented before, during and after each videoconferencing event. The research process consisted of four phases. Each phase is outlined below.

Phase 1: Pre-Videoconference Information Session

In the weeks prior to the videoconference students, along with their classroom teacher, received a presentation from the researcher that covered various aspects related to the videoconferencing session (the technology, what to expect, how to interact, being prepared, etc). The presentation included an overview of the research project along with the invitation to participate and consent process. Just prior to the videoconference most classes also held a short review or dry-run in preparation for the session.

Phase 2: Videoconference Session Observation and Capture

Each videoconference session was observed and captured via digital photographs and digital video recording. Some sessions were public events including special quests and media.

Phase 3: Post-Videoconference Survey Administration and Interview

The survey tool consisted of questions asking the participants about their perceptions of the use of videoconferencing to support teaching and learning. Respondents were asked to evaluate the content, the experience, the relevance and the technical quality of the videoconferencing session. The survey also included demographic questions, open ended questions, and an opportunity to add any other comments. Students and teacher/s completed the survey after the videoconferencing session. In most cases, participants also gave valuable insights and feedback through an informal post-event interview. The interview usually involved the entire class, however, in some cases only a small group of students participated in the interview. The survey was administered during scheduled class time. Survey instructions were given both verbally and in writing. The interview was conducted during or after scheduled class time.

Phase 4: Data Analysis and Follow-up Interview

The results from the survey were analyzed and summarized. Follow-up interviews were conducted for surveys that required additional information or clarification.

Student Perceptions of Learning through the use of Videoconferencing

After participating in an expert or peer-to-peer learning experience via videoconferencing, student participants were asked to evaluate the videoconferencing session from a non-technical perspective. Using a 5-point Likert scale, students rated the quality of the learning experience based on factors including quality of the content/speaker, curricular fit, level of interaction, and whether or not they learned anything new.

Student Evaluation of the Videoconferencing Learning Experience from a Non-Technical Perspective

Of the 204 students that participated in the research 36% rated their learning experience by videoconferencing as *Excellent*, 44% rated their experience as *Good*, 16% rated it as *Average* and 4% said their videoconferencing experience was *Poor*. None of the respondents selected *Very Poor*. Participants were asked to provide a reason for their selection.

An Excellent Learning Experience (36% of respondents)

Students provided the following reasons for indicating that they had an *Excellent* learning experience via videoconferencing:

1. High level of Interactivity. Videoconferences structured for high-level interactivity were strongly favored. These sessions involved a lot of planning and facilitating for interactivity, especially when larger numbers of students were involved. A strong majority of students appreciated opportunities to express their views, questions, research results, project

work and ideas to peers and experts. A sample of the students' explanations are provided below:

We all had a chance to talk about how we feel towards landmines and it was great that everyone got into the discussion and shared lots of different ideas and solutions with the experts.

I really enjoyed getting different math questions and solutions from students across the Country. It was great to share our math problems back and forth and watch the other class try to solve them. It's the first time I've ever heard cheering in Math.

2. High level of Activity: It was noted that students were less attentive after the first 15 minutes of a lecture-only style videoconference. Students preferred faster-paced videoconferences that included a combination of multimedia presentation, discussion and hands-on activity. Providing a combination of activities, or blended approach, kept students engaged for long periods of time –in several cases the sessions continued over two hours. As one student noted,

We got to see an excellent presentation with never-seen pictures of Mars from a real rocket scientist and we could ask questions and did an activity. It went really fast and I learned a lot about Mars.

There were lots of things that were accomplished. It was very active, fun and interesting. We didn't spend too much time on any one thing so I wasn't bored.

3. Engaging Content: Students that rated their videoconferencing experience as excellent indicated that the content was interesting or presented in an interesting way and/or the speaker was captivating. Often the content was

presented by a well-spoken, well-prepared expert in the field (i.e. researcher, novelist, astronaut) or by other students in the form of a debate, presentation, research summary, etc. Comments related to content regarded the sharing of different points of view as part of an excellent videoconferencing experience. One students explains,

> *I learned some very interesting facts and got an American point of view from the speaker. The different points of view from the students were informative to me as well. An interesting way to teach us current events and get us involved in them. I understand the war in Iraq issue much much better.*

A Good Learning Experience (44% of respondents)
A good learning experience as defined by participants included the same reasons as described above. The respondents that selected *Good* provided a few additional reasons for why their videoconferencing session was good. The videoconference was a good learning experience because it had:

4. High Quality Videoconferencing Technology: Even though participants were asked to focus on the learning and evaluate their experience from a non-technical perspective, over half of the respondents provided technology related reasons for their selection. Videoconferencing sessions that were technically high-quality were rated as better learning experiences as compared to sessions that had a slightly lower level of videoconferencing quality (lip sync, sound and image). It seems that participant learning experience is greatly influenced by the technical quality of the videoconferencing session. The connection between learning experience and technical quality is evident in the following statements:

> *The discussion was great but could have been better if we could have seen the other students better. At least the sound was good so I still learned from them.*

I think this was a great idea. It would have been excellent if we could have all communicated our ideas easier with the other students and mentor rather then sharing one microphone. But seeing as how this is supposed to be 'non-technical' I probably shouldn't have said that.

5. Good Facilitation: Both the technology and the learning need to be managed within a videoconference. Students' were more likely to indicate that they had a good learning experience if there was a facilitator at each site managing the following:

    - **Camera controls**: zooming in on the speaker, panning the room, showing a variety of participants and room perspectives with out zooming in too close or zooming out too far away.
    - **Sound**: having good quality echo-canceling microphones. Muting the microphones when no one from your site is speaking. Ensuring that participants speak with a confident voice.
    - **Session moderation**: preparing and cueing the participants for question/answer, debate and presentations. Managing the interactivity and transitions. Making the other site/s aware of needed technical adjustments or questions/comments –this was usually handled behind-the-scene in an online chat room.

When asked how the videoconferencing session could have been made better often the response was related to the need for better facilitation.

It could have been even better if someone was operating the camera so that we could see their faces close up when they were speaking –like our site did.

The second question was way to long and off topic and no one stopped them at their site. Otherwise it was pretty good and fairly interesting.

An Average Learning Experience (16% of respondents)

The students that indicated that their learning experience was *Average* provided some insightful reasons for their selection. Many of these respondents indicated technical frustrations such as difficulty with sound, lighting and image as a reason for their selection. The technical dissatisfaction expressed by respondents emphasizes the importance of having robust technology coupled with consistent technical support/testing and training for all participants. The non-technology related comments provide insights into the importance of good instructional design. The participants' feedback related to their learning experience is organized into following categories:

6. Appropriate Level and Curriculum Fit: Content experts have to be well prepared, regardless of whether they are scientists in the field, another teacher, a politician or a celebrity. The session must be in direct alignment with the grade level and curriculum. As suggested by the quote below, sessions that received a lower level of satisfaction from the students were either above or below the students' comprehension level or were perceived as non-relevant to the program of studies.

Some of the answers by the university professors were hard to understand if you didn't have information about the war. It wasn't really for junior high students.

7. Student and Speaker Preparation: As discussed above, speakers must have an understanding of the participants' comprehension level and the exact curriculum bullets to be covered. Students require curricular preparation so that they are prepared to ask questions, perform activities and confidently interact with peers and experts. In addition to curricular preparation, participants must be trained in the effective use of videoconferencing technology. Participants need to practice things like looking into the camera, speaking with a confident voice toward the microphone and operating the technology. Understandably, participants'

satisfaction increased as their level of comfort with the videoconferencing increased.

This was very different and we should have prepared more. It wasn't as fair because we had less experience then the other school but it was ok and we'll do better now that we know what it's all about.

8. Continuous Learning: Participants expect videoconferencing sessions to be smoothly embedded within the course or unit. Like most lesson plans, videoconferencing sessions require proper introduction and follow-up. Participants expressed the desire for a follow-up videoconference or on-going dialog. Participant satisfaction was lower with one-time events deemed incongruous with the course. An example is the Career and Life Management (CALM) class that was interrupted in the middle of an unrelated unit to participate in a videoconference on Safe and Caring Schools.

A Poor Learning Experience (4% of respondents)

Nine respondents out of 204 indicated that they had a *Poor* learning experience and 0 respondents selected *Very Poor*. Three reasons were provided for their selection. The number one reason cited by 6 out of the 9 respondents was not enough interaction or activity. The other two reasons provided were, inadequate facilitation and poor technical quality. It is interesting to note that these 9 respondents were all participants in sessions involving multiple sites and larger groups of students. Not surprisingly, in these arrangements there was less interaction, less activity and more challenges with regard to technical quality and facilitation. The results imply that students' perceptions of the quality of the learning experience may be impacted by the number of participants sharing the videoconference.

9. Class Size: There is a significant difference in satisfaction with the learning experience by videoconferencing when comparing small groups

of participants with larger classes of participants at the same school site. 100% of students in classes of 18 students or less felt that the learning experience by videoconference was *Good* to *Excellent*. None of the participants in these smaller classes selected *Average*, *Poor* or *Very Poor*. The data suggests that participant satisfaction may decrease as the number of participants at each site increases.

Session Number	Number of Student Participants At school site	Rating of Learning Experience			
		Excellent	Good	Average	Poor
1	6	83%	17%	0%	0%
2	9	44%	56%	0%	0%
3	18	56%	44%	0%	0%
4	29	24%	45%	24%	7%
5	38	16%	37%	36%	11%
6	39	13%	54%	28%	5%
7	65	18%	58%	20%	4%

Table 5.1 - Number of Participants vs. Quality of Learning Experience

The main reason for a less-then-*Good* response was lack of interactivity. As one student stated, "There were a lot of people so not everyone got to participate. I noticed someone falling asleep at the back." It stands to reason that in smaller groups there is greater opportunity for interaction. It was observed that students in small-group sessions were able to establish rapport and were more interactive with their peers or the speaker at the other site. The quotes below are representative of students' experiences in small-group sessions.

What better way to learn about a topic then to have someone who knows it inside and out to collaborate with and to share their life? This class was much more personal.

The collaboration with people from the east was very good. We got to know them and associate with them better. I found them smart and insightful.

10. Number of Sites Connected: Videoconferencing technology can support more then two sites connected to the same session at one time. This is called a multi-point videoconferencing and usually involves 3 – 5 sites. Increasing the number of sites connected affects the quality of the videoconferencing session in much the same way as increasing the class size. The more sites that connect, the more facilitation is required to ensure interactivity. Furthermore, as sites are added the size of the image on the screen decreases and the technical quality of the image is reduced. It is a challenge to identify and make eye contact with individual participants within the reduced landscape of each site. Point-to-point sites demonstrated more consistent interactivity between participants. Multi-point sessions tended to rotate interactivity between the sites. For example, in a four site videoconference one site would present while the other sites listened and then they would take turns asking questions. Accordingly, the multi-point sites tended to be more formally organized. Some students commented that the multi-point session was, "Too formal."

    This being said, it is still possible to have a good multi-point videoconference as indicated in the overall results. The multi-point sessions require more preparation, facilitation and technical provisioning to ensure the same degree of quality learning experience as the point-to-point session.

Student Perceptions of the Impact of the use of Videoconferencing on Achievement

Students were asked a variety of questions to capture their perceptions relating to achievement. Questions explored the subject-specific knowledge, skills and attitudes gained as a result of participation in the videoconferencing session.

A 92 % majority of students indicated that they had gained new knowledge, skills and attitudes as a result of the videoconferencing session. Eight percent (8%) were unsure if they learned anything new. Almost all participating students were able to describe at least one key curricular outcome that they believe was learned within the videoconference. The students were able to provide descriptions of what they learned often including quotes from peers or experts. A high level of students (87%) believe that they will retain all or much of this new knowledge long after the session. Below are two examples of student perceptions:

> *I learned about the American point of view and history behind it and how we Canadians view things. I now understand why and where things in the Middle East erupted from and why Iraq can be classified as a "rogue nation." I can list the pros and cons of why the USA and Canada should or should not go to war with Iraq –before the vc I didn't care so I couldn't list anything. I know that I'll remember this long after the unit exam.*
>
> *I learned that section 43 gives people the right to use force to punish their children however, people can use it to take spanking farther then they should and there is no definition for reasonable force. This mock trial taught me that lawyers sometime have to change their cross examination when the other side puts in something tricky - it's a lot harder playing the role for a real audience then just reading about it or acting it out in class. I have a much better understanding of how the legal system works after being in the middle of it and interacting with real lawyers. I'm actually a lot more interested in it now.*

Many of the students' perceptions about their achievement were voiced as a comparison between their learning experience in the videoconference and their learning experience in a more traditional approach. More student thoughts on achievement are found in the next section.

Student Perceptions of the Videoconferencing Learning Experience Compared to Traditional Approaches

Students were asked the question: What do you think of teaching and learning this way (by videoconferencing) compared to more traditional classroom approaches? Of the 204 students that participated in the research 30% rated their learning by videoconferencing as *Much better*, 49% rated this way as *Better*, 13% rated it as *The Same*, 7% said that learning by videoconferencing was *Not as Good* and 1% of respondents selected *Much worse* then more traditional classroom approaches. Participants were asked to provide a reason for their selection.

The majority (79%) of students said that videoconferencing interactions with peers and experts was a better or much better way to learn curricular content as compared to more traditional classroom methods. Students felt that they were directly engaged in the subject matter, that they received a greater breadth of opinions and that they were able to probe deeper into the content. Many students indicated that they would "never forget" the facts, ideas and information received within the interactive videoconferencing session. Sample quotes are provided below:

> *I think this is a great way to learn because I love to learn first hand rather then just reading about it. I was more interested in this unit and I remember everything (that is very unusual for me).*
>
> *I was motivated to learn a lot more about it so that I could engage in a real debate with other students and the expert. I got other points of view and it wasn't boring.*
>
> *I feel that I am more suited to learning this way. I like to talk to people, do research with technology and learn about real world things. I think students should really get involved with what they study.*

Thirteen percent of participants felt that the content (curricular material) was the same or that they learned the same amount of information and therefore it was the same as a more traditional approach. In other words, "you learn the same thing so it is the same." As another student stated, "I learned the same amount just in a different environment."

Less then 10% of students did not think the videoconferencing approach was as good as a more traditional classroom approach. The most cited reason for their selection was that they would have preferred to have the session live rather then "on screen." In addition, some students felt that this method would lose their interest over time. Two students voiced this perspective as follows:

> *It's fine the first time but people will get bored after awhile and end up not listening, where as if there was a real teacher in front of them they would have to stay in focus and on task.*

> *It's much better to have someone in the room live rather then listening to someone on a screen.*

Student Interest in Continuing to Learn through Videoconferencing

Student participants were asked if they would like to participate in future learning sessions using videoconferencing. Ninety percent (90%) of students said they would like to continue learning this way. Students cited the desire for further interaction with peers and experts as the main reason for their selection. The student-centered nature of these sessions was also indicated as a positive reason to continue learning this way. Students appreciated the chance to assume a more active role in their own learning and in the classroom. Many respondents included future session ideas in their reason for wanting to continue with videoconferencing. Sample quotes are provided below:

> *I'd like to use this in Social Studies; we could conference with other people on current news topics and other social related events. Students would be more enthusiastic about coming to class.*

> *I learn a lot better if I can get things explained to me in different ways and by different people. The student in Toronto taught me a new way of doing hard Math 30 problems and I hope to keep learning from them and the other math experts (including my teacher –she's great).*

> *I really enjoy learning this way; start with an interesting question, do research and then discuss it by videoconferencing with others who might have a completely different view on the subject. I think this independent method would work in every subject.*

> *I did a lot of reading to get ready to ask a good question. Then we had a great presenter with awesome multimedia, lots of questions/answers and fun activities. I really learned a lot and I'd learn more if we could have more classes like this.*

Ten percent (10%) of respondents preferred face-to-face learning experiences and felt that videoconferencing would soon become boring. In addition, respondents cited dissatisfaction with the technical quality of the videoconferencing session as a major reason for not wanting to continue. As one student stated,

> *This is fine once and awhile but It would get terribly boring looking at a somewhat fuzzy screen everyday –no thanks.*

Student Perceptions of the Relevance of this Learning Method to their Future

The students were asked to respond to the question: Did this way of learning have any relevance to your future? In response, 20% felt that this way of learning was *Very Relevant*, 47% rated this way as *Relevant*, 25% rated it as *Not Relevant* and 8% said that learning in this manner was *Very Irrelevant* to their future. Once again, participants were asked to provide a reason for their selection.

The majority of respondents (67%) believed that participating in videoconference-mediated learning had relevance to their future. The most cited reason was the development of skills that students felt would be valuable in their future. Students indicated that this experience enabled them to develop technical, research, independent learning, critical thinking and communications skills. Furthermore, they felt that these skills would help them in post-secondary pursuits or in the future world of work and citizenry. Some examples are provided below:

> *A great relevance to my future because I've learned computer, communications and research skills that will be of value when I'm trying to get a job in our high-tech world.*
>
> *I've been able to teach myself by doing research and asking questions of experts. This becomes an important skill to have later in life. Using technology will be very useful in the outside world where people are communicating this way more and more.*
>
> *I learned how to think critically and get directly involved in things that happen that impact our lives. This will help me in University and in life.*
>
> *It's preparing me to interact at different levels with people from all over the world rather than just with our peers and teachers who tend to all think the same way.*

> *As an ESL student I have more chance to practice my English skills then in a normal math class. I need good communications skills to get into University.*

> *Every career in the future will involve technology. We need this type of exposure to prepare us for the real world.*

The second most cited reason related to the 'real world' connection to the topics presented and discussed. Students appreciated the opportunity to grapple with important issues and events with experts at the heart of these matters -matters that will impact their lives as adults. Participants felt that the relevant information received from a variety of sources would help them make critical decisions in the future. Below are some examples cited by students:

> *As a future voting citizen, I have a much better understanding of both sides of the issues and how things will impact Alberta, Canada and the world. This will allow me to make better decisions in the future.*

> *I think differently because of this session and that will probably affect my opinion in the future. I will do more research and try to get other points of view before making a decision.*

Student Evaluation of the Videoconferencing Technology

At the end of the survey, participants evaluated the technical quality of the videoconference. From a technical point of view, 25% of respondents indicated that their session was *Excellent*, 38% said it was *Good*, 12% thought it was *Average*, 20% said it was *Poor* and 5% thought their videoconferencing session was technically *Very Poor*. Not surprisingly, the results are indicative of the technical fortitude experienced within the session. Most of the videoconferencing sessions (about 75%) had clear image and sound. Most often, the remote-site presenter's image was on a large screen aside their presentation which was on a second large screen (both projected with a high-quality projector in a semi-darkened room). As well, speakers and microphones were usually place around the room to accommodate better sound. About a quarter of the sessions experienced technical challenges ranging from poor sound and image to total failure (disconnect). Over the two and a half year period it was observed that the videoconferencing technology worked well with good 'TV quality' image and sound 75% of the time. In about 20% of the sessions the technology worked but the sound and/or image was not good and in one session the connection failed completely and they were not able to reconnect. The research results are consistent with these observations. It should be noted that once the network device that caused the total failure was replaced, the reliability and quality of the sessions improved.

Teacher Perceptions of the use of Videoconferencing to Support Teaching and Learning

Twenty teachers participated in the research study. These contributors were classroom teachers of the students involved in the videoconferencing sessions. In some cases, other teachers within the same subject area were involved in the development and delivery of the videoconferencing session and also participated in the research. In one example, a high-school science teacher with a lot of videoconferencing experience helped set-up and facilitate a videoconferencing session on *the Truth about Mars* for a grade 6 science class and their teacher. In this case, both teachers participated in the research.

Teacher Evaluation of the Videoconferencing Learning Experience from a Non-Technical Perspective

The teachers were asked to evaluate the videoconferencing session from a non-technical perspective. The aim of the question was to get teacher participants to consider the overall quality of the learning experience within the videoconferencing session. To assess the learning experience, teachers were asked to evaluate the quality of the content/speaker, curricular fit, level of interaction, and whether or not they felt that their students learned anything new.

Of the 20 teachers that participated 40% rated the learning experience by videoconferencing as *Excellent*, 50% rated the experience as *Good*, 10% rated it as *Average* and none (0%) of the respondents selected *Poor* or *Very Poor*. Teacher participants were asked to provide a reason for their selection.

An Excellent Learning Experience (40% of respondents)
The teachers provided the following reasons for indicating that they felt the videoconferencing session was an *Excellent* learning experience:

1. High level of Student Engagement. Teachers observed that their students were on task and genuinely interested and involved in the subject matter. One teachers' thoughts are provided in the quote below:

> *This was amazing. I got to know my students better by watching them share their knowledge and interact with others. It was wonderful to see them so engaged in a high level mathematical dialog.*

2. Unique Learning Opportunities: Teachers appreciated the unique learning opportunities that this environment provided for their students. Respondents felt that the students benefited from having, "insight from a world renowned expert," and/or the opportunity to share their work with peer and experts. The teachers believed that having access to varied cultures and points of view provided a rich learning opportunity for their class.

3. Increased Student Motivation: Many teachers commented that their students were highly motivated to learn the subject matter once they discovered that they would be sharing their knowledge and skills with others by videoconference. Teachers found that their students considered remote peers and experts to be more authentic audiences and therefore the students were motivated to really make sure they knew the content and issues. Students were said to be more independent, conducting research and preparing questions. As one teacher said,

Students self-discovered the fact that you have to know a lot about the subject at hand in order to be able to ask a really good question. They considered the remote students and expert to be a more important audience then just presenting before their classmates and me. As a result, I got the best student work I've ever seen out of them and they are doing very well on this unit.

A Good Learning Experience (50% of respondents)

A good learning experience as defined by the teacher participants included some of the same reasons as described above and a few additional thoughts. The videoconference was a good learning experience because it had:

4. Good Organization and Facilitation: According to the teachers, it was important to ensure that the videoconferencing session went smoothly. Like the students, the teachers also appreciated sessions that were well organized with a good balance of presentation, interactivity and activity – regardless of whether they facilitated the session themselves or not. The importance of good organization and facilitation is voiced in the following statement:

Everything was set-up and ready to go, including the students. It was good to just focus on the learning and have the presentation and varied activities so well organized.

5. Learning Opportunities for both Students and Teachers: Several of the teachers reported that they gained new knowledge, skills and insights along with their students. This form of situational learning, where teacher and students are co-learners, appears to be a preferred form of professional growth for many of the respondents as indicated in the quotes below.

The teachers were able to learn along with the students. I was taking notes like mad.

This was a very effective new type of PD for me. I have some great new teaching techniques from observing this master presenter and the students benefited from hearing the content and doing the neat activities. People should pay attention to this as a new way to support professional growth. I didn't have to leave my students and it didn't cost anything.

An Average Learning Experience (10% of respondents)
Comparable to the student results, the two respondents in this category indicated technical frustrations as the main reason for their selection.

6. Technical Fortitude: The technical dysfunction overshadowed the learning experience as explained by the two teachers below:

It would have been good except that at times you couldn't hear what the other group was saying.

In this mode, when the technology fails the students fail to learn.

Teacher Perceptions of the Impact of the use of Videoconferencing on Achievement

Over 85% (17 out of 20) of the participating teachers felt that the videoconference event enhanced student achievement. Teachers contended that through videoconferencing students were more directly engaged with the subject matter and could understand the real-world relevance of the curriculum content. Furthermore, the teachers believed that this heightened level of engagement and relevance resulted in higher levels of achievement as demonstrated by classroom assessment. One teacher reported that the class achieved the highest level of achievement (on the provincial exams) in that course, for that school. The class results were a full 7% higher then any other class of the same subject and level in the history of that school. It is impossible to directly correlate these improved results with the videoconferencing sessions given that other factors such as teacher professional growth could have caused the increase in achievement. The teacher, however, believes that using videoconferencing to connect to experts and mentors resulted in a deeper understanding of key concepts that were a major part of the provincial exam. Likewise, a science teacher explains,

> *On the diploma exam, my students were able to describe the effects of space travel on the human organ systems and even quote the space expert and astronaut. They remembered the high-level images and demos that the experts from the Canadian Space Agency showed them.*

A few teachers were unsure if the videoconference had a positive impact on student achievement. These teachers felt that it was not possible to correlate student results on tests with the use of this technology and they expressed concern that the sessions were not an exact fit with the curriculum or student level.
The consensus among participating teachers is that achievement is enhanced through the use of videoconferencing when the technology works well and the content is engaging, interactive, and directly correlated to the curriculum.

Teacher Perceptions of the Videoconferencing Learning Experience Compared to Traditional Approaches

The responses to this question were nearly identical to the responses regarding student achievement. The majority (85%) of teachers felt that videoconferencing provided the opportunity to connect to the living or real-world curriculum better then more traditional approaches such as text book activities, group work, videos, class discussion and lecture. Some teachers, however, said that videoconferencing took more time to cover the curriculum material then traditional methods. The main concern from respondents was the amount of time it took to implement and deliver the videoconferencing session. Some teachers felt that traditional methods were more efficient and did not require technical support.

Teacher Interest in Continuing to Learn through Videoconferencing

All of the teachers (100%) indicated a desire to continue to explore the use of videoconferencing to support teacher and student learning. The majority would like to use the technology for their own professional growth as well as to support student learning. Each of the participating teachers listed a number of future topics that they would like to explore through videoconferencing. Below is a sample of teacher responses:

> *I'd like to connect to a few other teachers in the same subject and level, just to share challenges and teaching tips. I'd welcome the opportunity to connect to experts just to keep myself current.*
>
> *The best part of this was that I learned along side of my students. This is a powerful model for PD since I didn't have to leave the classroom. I'm working on plans to connect to at least one more expert this semester and I want to try a virtual fieldtrip as well.*

Teacher Evaluation of the Videoconferencing Technology

Teacher respondents were slightly more critical of the videoconferencing technology then the students. From a technical point of view, 15% of respondents indicated that their session was *Excellent*, 50% said it was *Good*, 15% thought it was *Average*, 15% said it was *Poor* and 5% thought their videoconferencing session was technically *Very Poor*. In comparison with the student results, these results also correlate with the technical fortitude experienced within the session. Overall, the teachers felt that the technology was good but there were still some challenges associated with videoconferencing. Videoconferencing is new technology for schools and the teachers cited issues related to proper room design and configuration, technical support, professional development and the need for technical reliability and quality assurance.

> *You really need to know how to troubleshoot. If something can go wrong, it will!*

> *I always have a plan-B ready to go because the technology can fail. It works well most of the time but we need it to work REALLY well all of the time.*

> *I have a low tolerance for fuzzy images and poor sound –more so then my students.*

The majority of student and teacher participants in this study believe that high-quality videoconferencing coupled with sound instructional design does support student achievement in a way that is both relevant and engaging to the learner. The insightful 'lessons learned' as a result of this study are discussed in Chapter 7.

CHAPTER 6

The Technical Part

If at first you do succeed,
try to hide your astonishment.
-Karen Andrews

This chapter is written for everyone (technophobe to technophile alike). The figures are set apart for those interested in more specific technical information. The technical objective of TeleLearning is to enable secure, reliable and decent quality (30 frames per second) videoconferencing/streaming in multiple locations within a school. Network infrastructure must be established prior to videoconferencing, so we'll start there. In the discussion of the various videoconferencing solutions, once again we'll travel from humble beginnings to the "current" practice at the time of this writing.

Infrastructure

Videoconferencing is a broadband application that requires, at bare minimum, a cable modem and at best quality, a high speed connection that is dedicated (or partitioned) solely for this purpose –it requires Quality of Service (QoS) or an assured level of network consistency for decent quality and reliability. Videoconferencing is not an application that can be run, with reliability, over the regular school Local Area Network (LAN) when this network is maximized in supporting computer labs, classroom and administrative computers all connected to the Internet.

The problem is twofold. Normal school LANs are configured for normal school use and will experience periods of high demand (i.e. when computers are fully operational and everyone is accessing the Internet), this causes network congestion that restricts the amount of network bandwidth available for videoconferencing –so your videoconference fails or is highly inconsistent. Think of the plumbing in older homes. Only a limited amount of water flows to each appliance through a shared infrastructure therefore, someone in the shower won't appreciate the toilet being flushed.

The second problem with normal school LANs is that they are connected to the regular (commercial) Internet. The Internet is another source of inconsistency. The internet is an interconnected jungle of unknown devices all negotiating the transfer of data across the vast web. Data or any bit of information moving from point A to point B on the internet is at the mercy of unknown traffic patterns and many devices along the way at that given time. The internet is not consistent and some would argue that it may not be safe either. If you've ever experimented with NetMeeting on the Internet, it's likely that you encountered the dark side of videoconferencing. Protecting your network against unwanted access is an important consideration of videoconferencing as well.

For these reasons, an alternative to the use of normal school infrastructure is required. With the help of Shaw Communications Inc. and Netera Alliance (our high speed research network operator in Alberta) a solution was created and implemented for J. Percy Page School. This solution was evaluated for quality and security purposes by an independent consulting firm from Calgary, Alberta.

Assuring quality and security required the creation of two independent networks. The normal school network, or LAN, handled regular school applications, connections to the district office (through a Virtual Private Network device - VPN) and Internet traffic.

The second network was dedicated for videoconferencing and bandwidth hungry applications (videoconferencing, videostreaming and multipoint collaboration applications). This broadband network connected the school to the Alberta advanced research network (NeteraNet) and then to Canada's advanced research network (CA*Net). These research and education networks are not on the commercial Internet. CA*Net is an independent network funded through Industry Canada and operated by CANARIE (see map below from www.canarie.ca). The CA*Net network connects Canadian institutions to other research institutions and research and development initiatives anywhere on the globe. Developed countries have equivalent research networks that can connect or "peer" with each other, for example, the U.S network is called Internet2 and in the U.K it is called JA*Net (or Janet).

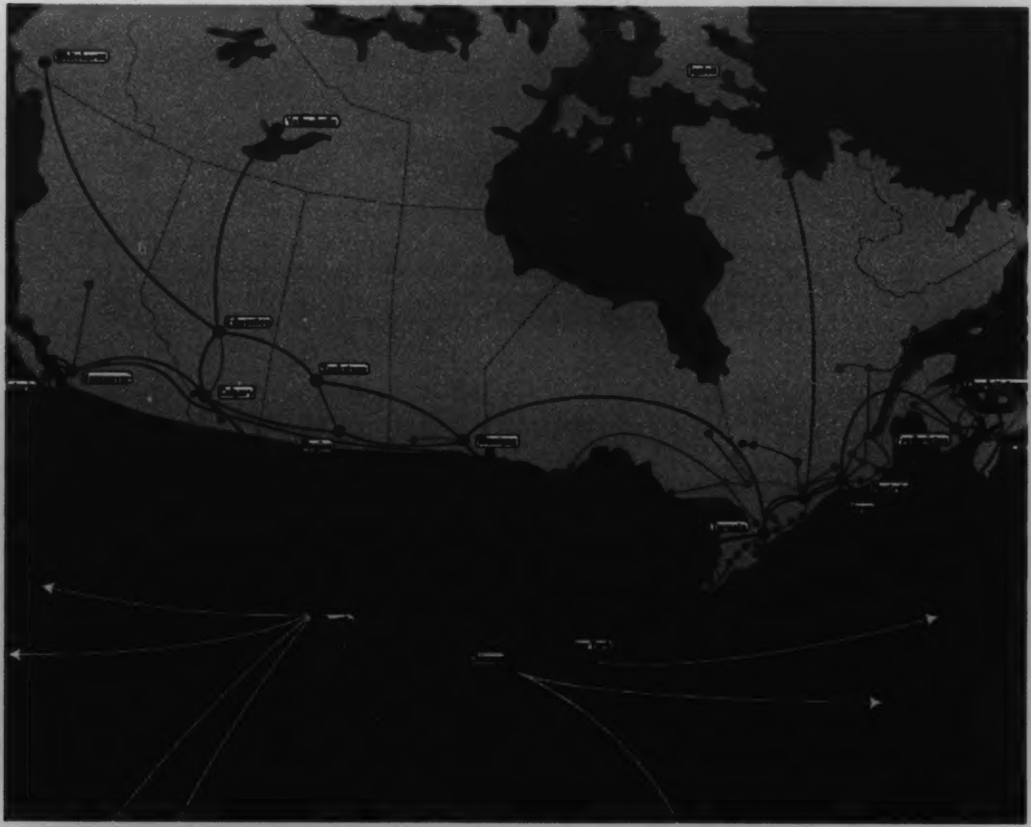


Figure 6.1 – Map showing CA*Net Network

The connection to CA*Net facilitated many partnerships between the school and universities and research entities such as the Communications Research Centre, National Research Council, National Arts Centre, Banff Centre for Arts and New Media and the National Science Centre. In addition, partner schools anywhere in the world could travel to their closest university to utilize the established facilities and support to connect to CA*Net.

Unlike the Internet, CA*Net is a well maintained service that connects known organizations to one of the fastest networks in the world –it's a huge pipe.

With Shaw and Netera paving the way, J. Percy Page was the first K-12 sector member to be connected to the CA*Net superhighway. We agreed to follow the CANARIE acceptable use policy (AUP) to protect CA*Net from unwanted traffic – keeping the LAN and CA*Net traffic separate.

At the school level, CA*Net network connections were marked for CA*Net use Having multiple spaces with CA*Net connections facilitated a variety of applications –from very large groups (450 students and staff) to individual videoconference meetings. CA*Net spaces in the school include the library, a small classroom within the library called the Global Classroom, the music room, the conference room, a computer lab, a small office and a temporary connection in the large gym. The network drops in each room were fed back to the main switch (see Figure 6.2). This managed switch was configured for CA*Net traffic only and was connected by fibre to the Shaw Fibrelink backbone that ran through NeteraNet to the Calgary point of presence (POP) and onto CA*Net.

A Word about SuperNet

With the creation of provincial independent networks such as SuperNet in Alberta and Orion in Ontario, schools will have the infrastructure necessary to carry out broadband hungry applications without going to all of the efforts described above. Also, SuperNet will support the H.323 codec described later in this chapter.

With the infrastructure in place, it was time to figure out which broadband applications were needed to support the learning programs. We started by connecting to the National Film Board collection of streamed videos and moved to videoconferencing applications shortly there after.

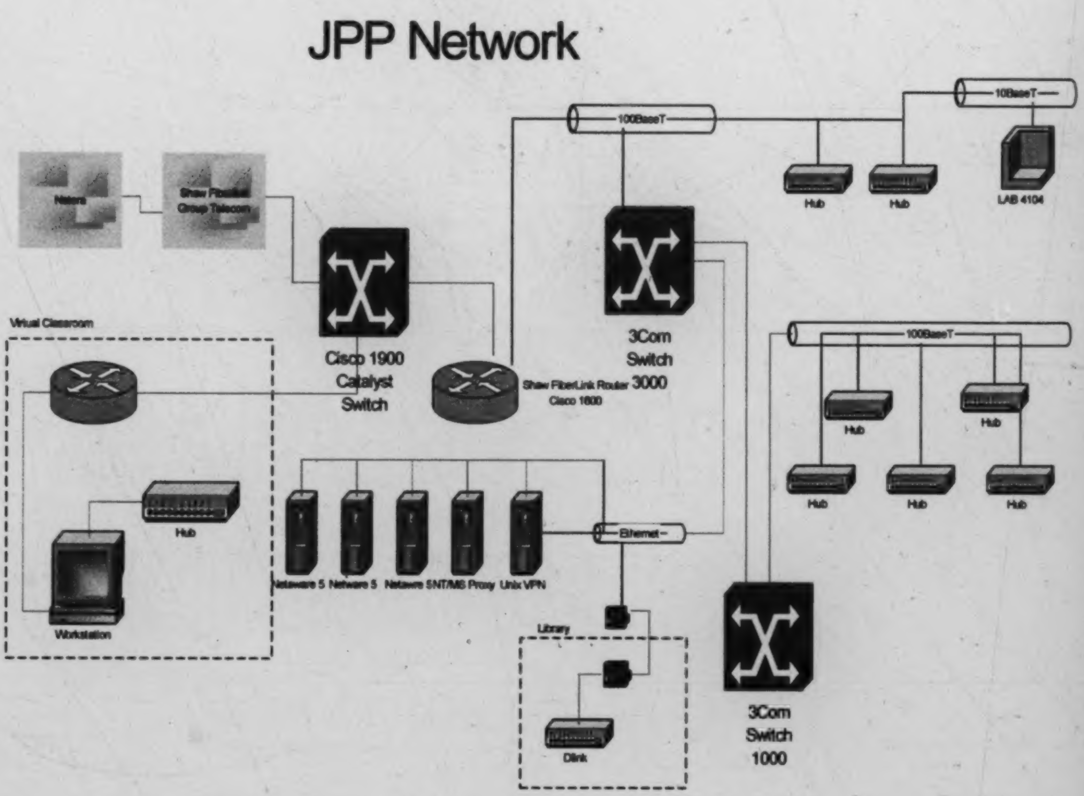

JPP Network
Netera
Shaw FiberLink Group Telecom
Cisco 1900 Catalyst Switch
Shaw FiberLink Router Cisco 1600
3Com Switch 3000
100BaseT
10BaseT
Hub
Hub
LAB 4104
Virtual Classroom
Hub
Workstation
Netaware 5
Netware 5
Netware 5
NT/MS Proxy
Unix VPN
Ethernet
Library
Dlink
100BaseT
Hub
Hub
Hub
Hub
Hub
3Com Switch 1000

Figure 6.2 – Network Diagram

]

National Film Board (NFB) Cineroute Videostreaming (www.NFB/cineroute.ca)

The NFB Cineroute application is a collection of videos that are streamed at around 1.2 mb/s. The collection also contains images that can be (right click) saved for teacher and student use. Connection to the NFB streaming server was facilitated by Netera. The service is free of charge to anyone on CA*net -it requires static IP addresses and there is an online form/process to be completed. Processing time is approx. 2 days before the site is connected. Once connected, a browser is used to connect to the Cineroute interface and videos/images can be selected from there. Cineroute has an intuitive interface with teacher friendly ease of use. The technical details can be found on the NFB website (www.nfb.ca).

Videoconferencing Systems

The following section will discuss the two different types of video conferencing applications used at J. Percy Page: ISABEL and the H.323 protocol applications/systems.

ISABEL Multipoint Videoconferencing

ISABEL or Infrastructure for Supporting Advanced Broadband Experiments and Labs, is a collaborative videoconferencing application developed by a team of students led by Juan Quemada at the University Polytechnic de Madrid in Spain. In Chapter 4, Figures 4.1, 4.3, 4.6, 4.7, 4.9 and 4.10 all demonstrate ISABEL.

The ISABEL application runs u[illegible] Linux operating system and supports many unique features including,

- Multicasting
- Integrated Flow Server
- Traffic regulation
- Support for large multipoint collaboration sessions over heterogeneous networks
- Support for various modes: Telemeeting, Teleconference and Telelearning.

There are three modes of operations, tele-conference, tele-meeting, and tele-class. The tele-conference mode is designed for a large number of sites where each site may have a number of viewers, i.e.; an auditorium. All controls such as video, audio, or tools are given to the master site during startup. Minimal controls can be given to participating sites, but are done by the master. This makes for a more structured, less chaotic event.

The tele-meeting mode is for a smaller group, i.e.; small meeting involving 2 to 4 people. In this mode of operation, controls are open to all participating site. A completely open environment compared to the tele-conference. This can pose a problem is there are too many people trying to take control.

The tele-class mode fits in between the other two modes. Some controls are open to all sites, however, there is still a sense of structure. The site who currently has control, can give over control when they are finished to another site. There is still however, a master controller.

An important feature of ISABEL is the flowserver. Similar to a Multipoint Control Unit (MCU) that allows more then two sites to connect at once, the ISABEL flowserver has additional functions. One function is to bridge networks together, i.e. can be used to bridge a unicast environment with a multicast environment. A second function would to lighten the CPU load of the Interactive ISABEL workstation during a session or event.

ISABEL was still in development when we started using it at J. Percy Page. The beta version of the application was downloaded at no cost from the University's ftp website. Today, a commercial version of ISABEL is now available through Agora Systems and they are developing a Windows-based version. The Linux system required Red Hat 2.0 operating system or higher. It also required someone with a working knowledge of Linux. Linux systems and support are not commonly found in Canadian schools. Furthermore, the instructions for the beta version were in Spanish.

As inferred above, ISABEL is technically challenging. We depended on the help of the Communications Research Centre in Ottawa for the set up and operation of the system –the CRC BAD Lab (Broadband Applications Development) provided training and support. For this system to work, all of the right components had to be in place and configured properly –and not moved around to much or tinkered with!

In addition, all sites must be using ISABEL to participate in a collaborative videoconference. There are few schools using ISABEL, in fact, most are using the H.323 standard. ISABEL is a broadband application requiring about 5 mbps transmission rate and therefore, schools using this application required a very robust network and broadband connectivity.

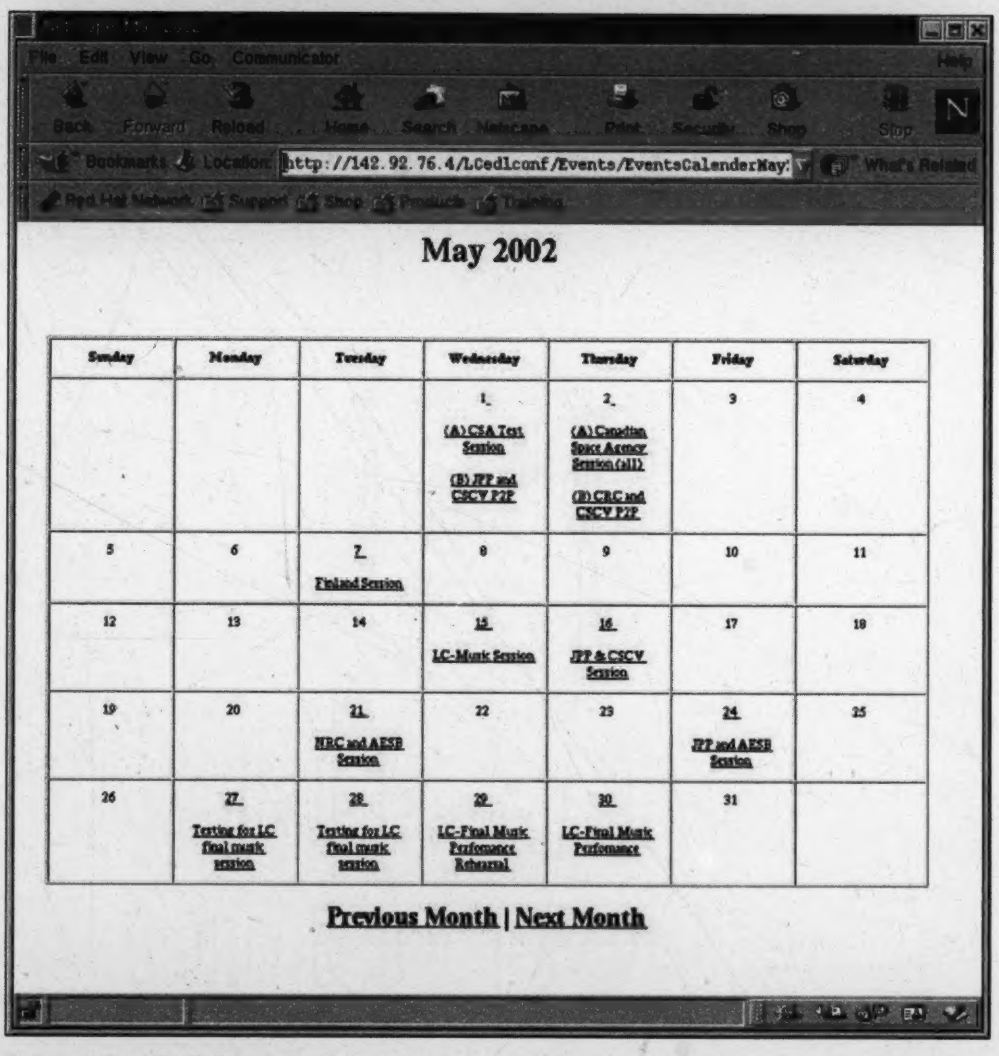
Once operational the ISABEL system proved to be quite stable and reliable. The strength of this application is that it offers a complete package of multi-point (many sites connecting at once) collaboration tools. With ISABEL we could be videoconferencing with three or more schools/sites and at the same time all sites could share video clips, PowerPoint slides, queuing board to indicate the order of questions from the sites and a common white board. All of the tools required were found within the one application.

The management tools were another helpful feature of this software. A management interface could be controlled by another monitor so that the technical management of the videoconference could be handled behind the scenes (not on the participants' screen). The management interface had a good set of tools including the ability to adjust the gain on the microphone, sound, lip sync, image color / brightness and image capture (screen shots). The local and remote images could be resized and moved around on screen.

Furthermore, any background could be added to provide an attractive landscape that was relevant to the subject matter at hand. In the example image on page 27 (Figure 4.3), the students were debating the Kyoto Protocol with experts in Toronto. The speaker's image is large and the student images at the remote sites are brought up for question and answer period. The configuration of image windows is selected from a variety of patterns on the management screen. The learning backdrops for each ISABEL session was designed and created by students that were participating in the session.

The joint calendar is another attractive feature of ISABEL. Participants planed and booked sessions in one shared location. The calendar was used by technical support staff as well as event coordinators and participants.

Figure 6.3 below illustrates the event calendar with various scheduled events.


File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Location
What's Related
Red Hat Network Support Shop Products Training

http://142.92.76.4/LCedlconf/Events/EventsCalenderMay:

May 2002

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1 (A) CSA Test Session (B) JPP and CSCV P2P	2 (A) Canadian Space Agency Session (all) (B) CRC and CSCV P2P	3	4
5	6	7 Finland Session	8	9	10	11
12	13	14	15 LC-Music Session	16 JPP & CSCV Session	17	18
19	20	21 NRC and AESB Session	22	23	24 JPP and AESB Session	25
26	27 Testing for LC final music session	28 Testing for LC final music session	29 LC-Final Music Performance Rehearsal	30 LC-Final Music Performance	31	

Previous Month | Next Month

Figure 6.3 – ISABEL Event Calendar

The LearnCanada project proved that there are some functional advantages of the ISABEL application over the H.323 systems. The advantages include the collaborative tools allowing users to shared and edit documents, slide presentation feature, and capability to run higher quality video with multiple sites. As well, the new portal feature, which has been incorporated into the new versions of ISABEL, is an improvement. Another benefit is the flowserver as discussed above.

Some of the disadvantages come from using the Linux OS. If the end user has little or no experience with Linux, this is a big disadvantage. As well, the current standard for videoconferencing is H.323 and therefore we were not able to use ISABEL to connect to the majority of collaborative partners. The need for considerable technical support, the migration to SuperNet and the desire to connect to anyone on the globe, compelled J. Percy Page to move to the H.323 codec.

H.323 Videoconferencing System

H.323 is an alternative solution for videoconferencing. H.323 uses IP or Internet Protocol. For the LearnCanada project, the H.323 was used to reach areas where bandwidth was more limited or where ISABEL was not available. In Chapter 4, Figures 4.2, 4.4, 4.5, 4.8, 4.11 and 4.12 show the H.323 systems.

The H.323 systems used at J. Percy Page were the VCON Vigo and later the Polycom FX. The VCON Vigo was a portable system with one (upgraded) programmable Cannon Communications Camera and one room (table-top) microphone. The system used two different software applications; V-Point and Meeting Point. The main difference between the two applications is that Meeting point allowed the user to resize the screen sized by grabbing the corner and dragging it to the requested size. V-Point allowed on-screen camera control so that no remote control was needed to move the camera and zoom. V-Point was considered an upgrade from Meeting point. Figure 4.11 in Chapter 4 is a good example of what V-Point looks like. The Vigo worked well for small groups and for sessions that required portability. It could be easily packaged and sent anywhere on the globe. The Vigo could support point-to-point conferences up to a maximum of 2 Mbps. When more then two sites were connecting, either the Netera or the U of Ottawa MCU was used.

With the financial assistance of a Network of Innovative Schools grant, J. Percy Page was able to purchase a Polycom FX. This system was equipped with a built in 4 point MCU, capable of 2 Mbps in a point to point session and 386 Kbps in a four point session. Figure 4.12 demonstrates the FX unit.

The H.323 systems used did not support data collaboration well –meaning that participants could not share anything but their sound and image. If the session required a video clip, Powerpoint or other application, a secondary technology had to be used.

Bandwidth Requirements (Data supplied by Bobby Ho, Communications Research Centre, Ottawa)

By making some assumptions, it is possible to derive total bandwidth requirements for each application. It is anticipated that initially a dedicated facility within a school would be established to serve the needs of the teachers and students and that over time, the technology would be deployed to additional spaces. Bandwidth requirements per classroom/unit are defined in Table 6.1.

Application	**Bandwidth Utilization (Mbps)**	
	Low End	**High End**
ISABEL	2	5
H.323	0.3	3

Table 6.1 Bandwidth Requirements per PC Station

Typical utilization would range from 0.3 to 5 Mbps. Based on these figures, projected bandwidth requirements for school/ boards are listed in Table 6.2.

Scope	Bandwidth (Mbps)	Technology Solution
Single Facility Per School		
School	10	Fast Ethernet
Board (10 schools)	100-200	Gigabit Ethernet
Every Classroom		
Classroom	10	Fast Ethernet
School (10 classroom)	100-200	Gigabit Ethernet
Board (10 schools)	1000-2000	10 Gigabit Ethernet

Table 6.2 Projected Bandwidth Requirements per school/board

Since not all nodes would be accessing the network simultaneously, these numbers being conservative, would allow room for growth. Bandwidth management technology should be deployed to minimize the cost for broadband services while guaranteeing bandwidth for applications sensitive to jitter and latency.

Data Collaboration

In most of the videoconferencing sessions teachers and/or students would want to share presentations or text-based ideas and questions in addition to the sharing of their image and sound within the videoconference. The participants preferred a blend of videoconferencing with online tools. For this blended arrangement each session required a computer connected to a projector and the Internet in addition to the videoconferencing equipment (connected to a second projector or monitors). A number of secondary applications were used to supplement the videoconferencing experience. A number of these applications are listed below.

Online communities: This was the most common approach to document sharing and collaboration. Teachers or students would post their presentations, video clips, discussion questions or materials on the online community for participants to access during the videoconference. As well, the Chat feature on the community was highly utilized for behind-the-scenes management of technical and process details as well as for participant comments and suggestions. Some examples from the behind-the-scenes chat room are listed below:

> *Student1: That was great!*
> *Tech1: Can you please mute your microphone? Thanks.*
> *Tech2: Oops*
> *Tech1: Much better. Thank you.*
> *Student2: I missed that, can you slow down please?*
> *Tech1: Please zoom in a bit closer to the speaker –we can't see the demo.*
> *Student3: I get it! Bring on the test!*
> *Student4: The Ontario Sci Centre rocks! Thanks you guys!*
> *Expert1: You're welcome. You are very smart students!*

RealVNC: VNC (Virtual Network Computing) remote access software makes it possible to view and fully-interact with one computer from any other computer or mobile device anywhere on the Internet. VNC software is cross-platform, allowing remote control between different types of computer. There is a Java viewer, so that any desktop can be controlled remotely from within a browser without having to install software. The system allows several connections to the same desktop, providing a tool for collaborative or shared working in the classroom. Along with the online community, VNC is a very popular application and was used in most of the videoconferencing sessions described in Chapter 4. An endearing quality of VNC is that it's free. The open source version of VNC is free to download from www.realvnc.com.

WebEx: A fee-for-service application that allows multiple online users to access, view and share a multitude of applications including PowerPoint, Flash animations, and interactive whiteboards. From the WebEx website: *Spontaneously share presentations with smooth animations and transitions that capture the power and feel of live presentations. Instantly share any business-critical application or Web content to enhance the interactivity of a live demo or team* *meeting* (www.webex.com). At least one of the sites involved in the videoconference must purchase a WebEx account in order to use this application.

Macromedia Breeze and VSee: These are both web-based collaboration tools that include video, audio and shared applications. They allow multiple users to connect and share presentations on the Internet. Breeze uses the Flash application that most newer computers have. Licensing fees apply (www.vseelab.com) (www.macromedia.com/software/breeze).

Required Technologies

The optimal setup for videoconferencing requires the following equipment in each classroom:

1. Two projection devices; one to display the remote videoconferencing site (a monitor can be substituted but the image is much smaller); one to display presentation materials. These should be side-by-side so that the participants can easily view both the speakers and the presentation.

2. One or two cameras; to capture the main speaker and the audience or the front and back of the participating group. The camera should be programmable and pre-set to zoom in/out on participants and speaker. In larger groups the pre-set should be programmed to zoom in on groups of three participants. The facilitator requires a map of the camera pre-sets. The speaker's camera should be placed at eye level and as near to the screen/monitor showing the remote site/s as possible. This will facilitate "eye contact" with the remote site. Often the camera/s is included with the codec (all-in-one unit).

3. Videoconferencing codec: Computer/device to handle the videoconference.

4. Large screen/s or white wall space. One screen/wall is required for each projection device used.

5. Microphones; tabletop room microphones, one microphone for every 5 (or so) participants. If there are limited microphones then participants will have to come up to the microphones in order to be heard. Four well-placed microphones will usually cover the entire classroom.

6. Speakers; Good quality, directional speakers that can be re-positioned as required.

7. Optional: Two monitors; one to show the local image for camera adjustments, etc. and one at the rear of the classroom (near the remote camera that the speaker will look into) for the speaker to see the remote audience. Recommended for large sessions or "big" events.

8. Computer/s on the Internet; one to display the presentation materials; one or more to participate in behind-the-scenes chats/discussions.

9. Optional: A mini-mixing board to handle the sound levels and various media.

10. Supportive multimedia; DVD/CD, VCR players and recorders.

To accommodate a wide variety of subjects, teaching styles and activities, the videoconferencing classroom, including furniture and equipment, should be a flexible learning environment. In the TeleLearning Centre, everything is movable. All of the furniture, technologies and even the walls can be quickly reconfigured to suit the instructional design of any videoconferencing learning session –this flexibility is discussed further in Chapter 7.

CHAPTER 7

Lessons Learned: Factors that Effect Student Learning in the Videoconferencing Classroom

Intellectuals solve problems;

geniuses prevent them.

- Albert Einstein

The Importance of Sound Pedagogy and Robust Technology

Videoconferencing and associated applications are communication tools that allow educators, experts or distant peers to virtually join the classroom. The tools alone do nothing and are not very engaging. It is the individuals using these communication tools that determine whether or not they are successful in facilitating student learning. Videoconferencing is a disruptive technology that does not support traditional methods of instruction –not successfully. In evaluating videoconferencing-delivered courses, Schiller and Mitchell (1993) state that video conferencing requires a different teaching methodology from any that traditional lecturers have previously used. Videoconferencing requires placing a greater focus on the human experience of teaching and learning, adopting a more learner-centered approach to teaching, as well as becoming technically proficient at using the videoconferencing facilities. We're all used to watching TV but we're not used to communicating with it. Teachers need to be comfortable with technology-mediated communication to the degree that they can exercise instructional methods that involve and engage learners. The videoconferencing teacher, therefore, requires a new set of skills and methodology –for without them, videoconferencing is not very engaging. As an observer in the Alaska Rural Schools Project, notes;

> *Videoconferencing can add a whole new layer of boredom to the classroom* (Gaither, 2004, p. 1).

In a study by Judith Tennant (1999), students concur that the degree of videoconferencing success largely depended on the personal style of individual lecturers and also, on how well the lecturer dealt with the constraints imposed by unfamiliarity with the environment and glitches with the technology. And so, additional factors such as the technical fortitude of the technology and the appropriate environmental design of the learning space also play an important role in ensuring student achievement.

It comes as no surprise that the key to successful learning in the videoconferencing classroom is largely dependent on the teaching methodology or instructional design used and the technical/environmental factors. In other words, good pedagogy and good technology leverages learning in the videoconferencing classroom. Fortunately, there are many research-based tips and lessons learned within these very broad themes of pedagogy and technology. The next section provides helpful research-grounded advice to inform those that dare to explore the use of videoconferencing to support learning.

Factors That Impact Student Learning

The TeleLearning study (see Chapter 5) coupled with a broader review of the literature, identifies common factors that impact student learning in the videoconferencing classroom. The factors are listed below and then described in more detail.

1. Champions and Leadership
2. Technical Fortitude
3. Instructional Design
    a. Engaging Content
    b. Activity and Interactivity
    c. Facilitation and Preparation
    d. Class Size
4. Environmental Design

Tip: Select your teachers carefully, build a team of champions and ensure committed, involved and supportive leadership.

1. Champions and Leadership

The most important factor in terms of student engagement and learning in the videoconferencing classroom is the teacher. The teacher's skills, comfort, and ability to facilitate learning while juggling the technical requirements determines the success of the videoconferencing program.

It is critically important to select the right teachers for this environment. Keep in mind that the videoconferencing environment magnifies teaching style. Furthermore, the majority of research indicates that student performance is largely a result of good teaching and good teaching is not substantially affected by the technology-mediated mode of delivery (Sullivan, Jolly, Foster and Tompkins, 1999; Berge and Mrozowski, 2001).

Videoconferencing requires a champion teacher or team of champions that are willing to take a risk and try innovative ways of teaching and learning. For our purposes, the term 'champion' refers to a teacher that can design and manage an engaging lesson that includes activity, interactivity, multimedia, etc. to groups of students at a number of different sites, while at the same time, juggle the remote control (operate multiple cameras and microphones), the fax, the interactive whiteboard and a computer, and manage to be humorous, charismatic, calm and composed (ready to implement 'Plan B' just in case).

The champion has to find ways to build rapport and establish a presence with students while ensuring that each student receives meaningful attention regardless of their location (local or remote). With or without support, the champion has to ensure that the technology is working and the materials are there for the students. Regardless of whether the champion is managing the session personally or facilitating for an expert speaker, either way, they need to prepare for all of the variables. Additionally, the champion is a mentor to others and hosts an onslaught of special guests and observers. They often participate in a community of videoconferencing practitioners as well as on-going, job embedded professional growth opportunities in order to hone their skills in the videoconferencing classroom. With these advanced skills coupled with the ability to handle challenges, it comes as no surprise that these champion teachers often become school and district leaders (LearnCanada, 2002; ABEL, 2004).

In light of the challenges faced by videoconferencing teachers, leadership needs to be directly involved in videoconferencing classrooms. Leadership sets the tone, establishes the culture and motivates the staff in schools. Leaders can help, encourage and support their champions. They can build a team of champions and/or connect to outside teams to reduce the isolation and support professional growth and collaboration for their videoconferencing teachers.

There are numerous ways that leaders can support their champions, some ideas include:

- ensuring that the site has robust technology (infrastructure and equipment),
- implementing a job-embedded staff development program to address the operation of the technology and also the instructional strategies necessary for effective use,
- providing appropriate space/s for videoconferencing and creating an engaging environment for the program,
- being flexible in timetabling and/or providing release time when required,

- providing materials and resources,
- providing technical and/or administrative support,
- promoting the videoconferencing program and events through school/district publications, events and staff meetings,
- communicating videoconferencing program information and events to parent council and/or community,
- encouraging others to get involved and develop a team of champions and/or connect to outside teams to reduce the isolation and support continuous professional growth and collaboration,
- participating in videoconferencing classroom events and activities,
- ensuring continuous assessment, research and evaluation of programs and processes,
- hosting policy makers/program funders and special guest (media, parents, leaders from other schools, etc) in agreement with the teacher/s, and,
- holding regular meetings and/or opportunities to talk with champions and their students.

Tip: Ensure high quality, synchronous transmission of image and sound through the use of IP-based (H.323) videoconferencing equipment over non-commercial broadband networks.

2. Technical Fortitude

The success of the videoconferencing session, as reported by participants in the TeleLearning study (Chapter 5), was directly related to the technical quality of the session. Research participants found it difficult to separate the content from the technical quality when evaluating videoconferencing experiences. Participants would tolerate slight jitter or the odd latency but for the most part, they expected "CNN" or TV quality image and sound. The number one reason cited for low evaluations on videoconferencing sessions was poor technical quality. Excellent content is fruitless if learners can't hear or see it properly.

Robust technology is a necessity to ensuring learning in a videoconferencing program. As discussed in Chapter 6, the first step is to ensure adequate bandwidth to support two-way, interactive video and audio. Holznagel (2003) explains that broadband networks are important because,

> *For most practitioners, high bandwidth is one of the keys to successful interactive video because of the need for high levels of motion and switching between sites during activities (p. 34).*

Once the network infrastructure is in place, good hardware and software are needed to ensure that participants can have TV quality image and sound. Research indicates that learner performance is impacted by the quality of the image and sound. Hampel and Hauck (2004) found that when teachers can not discern visual clues and body language of the students, it is easier for confused students to sit quietly without participating and without getting help or encouragement. Likewise, the importance of clear audio and visual communication is recognized by Lecourt (1999), and Kress and van Leeuwen (2001), who argue that lack of body language and depersonalization are real learning barriers in poor visual applications.

The solution is to use Internet Protocol (IP) videoconferencing equipment on non-commercial broadband networks (more detailed technical information is found in Chapter 6). The current international standard for videoconferencing codecs (the way information is coded and encoded within the device) is H.323, or IP-based videoconferencing. This standard leverages broadband networks to supply a higher level of quality and consistency in videoconferencing. Many Internet providers now offer broadband capacity. To ensure and manage quality and reliability, however, educational videoconferencing should be conducted over networks reserved solely for education and research purposes. These research networks, such as SuperNet, NeteraNet, Ca*Net, Internet2, are not congested with commercial and general public traffic.

Tip: Adopt a variety of well planned, research-based methods to make the content engaging for the learner, keep lectures to a maximum of 15 minutes and ensure that all participants are actively involved.

3. Instructional Design

a. Engaging Content

Videoconferencing often involves long periods of watching, listening and talking to a screen/TV. This can be a tedious experience if the content is dry. Some refer to this as the "talking head" syndrome in which participants involuntarily view someone lecturing for a long period of time. Mason (1998) found that lecture alone is not a good way to deliver content through videoconferencing. She states that,

> *Lecturing is a perfectly valid method of conveying, explaining and reinforcing information, but two-way videoconferencing is not necessarily the appropriate medium for it (p. 10).*

'Content' refers to the curriculum-based information, knowledge, skills and viewpoints that learners acquire within the learning activity. In the TeleLearning study (Chapter 5), students that rated their videoconferencing experience as excellent indicated that the content was interesting or presented in an interesting way and/or that the speaker was captivating. Often the content was conveyed by a well-spoken, well-prepared expert in the field (i.e. researcher, novelist, astronaut) or by other students in the form of a thought provoking debate, presentation, research summary, etc. In each case, the content was made interesting by the person facilitating the videoconference. Often the content was communicated through humor (cartoons, jokes, stories), multimedia (interesting images, short video clips, flash animations, PowerPoint) and/or inquiry (probing questions, debate). Students appreciated teachers/presenters that were excited about the subject matter and were animated in their delivery of the content. In addition, less-engaging lectures were broken into short 15 minute sections that were coupled with activities and interactivity.

b. Activity and Interactivity

Videoconferencing has largely been sold as an interactive medium. Tuttle (2004), however, notes that in many videoconferences, students are fortunate to be able to answer a question, let alone ask one. It is challenging to avoid one-way exchanges. Research indicates that it is essential to ensure that every learner is an active participant in each videoconference. Kunz (2002) evaluated around 200 videoconferencing-based classrooms and found that *more active involvements of the participants is critical*. The term *activity* generally applies to an individual or group of individuals performing an active curriculum related task while the term *interactivity* describes the social interaction between various learners. Bates (1997) explains that both are important,

> *the first is an individual activity that is the interaction of a learner with the learning material, be it text, television or computer program; the second is a social activity that is the interaction between two or more*

> *people* ***about*** *the learning material.* ***Both*** *kinds of interactions are important in learning.* (emphasis in original; p.100)

In the TeleLearning research (Chapter 5) the number one reason sited for rating a session as *Excellent* was that the session was highly interactive and/or active. To illustrate, some of the student's comments are provided below.

> *We all had a chance to talk about how we feel towards landmines and it was great that everyone got into the discussion and shared lots of different ideas and solutions with the experts.*
>
> *I really enjoyed getting different math questions and solutions from students across the Country. It was great to share our math problems back and forth and watch the other class try to solve them. It's the first time I've ever heard cheering in Math.*
>
> *We got to see an excellent presentation with never-seen pictures of Mars from a real rocket scientist and we could ask questions and did an activity. It went really fast and I learned a lot about Mars.*
>
> *There were lots of things that were accomplished. It was very active, fun and interesting. We didn't spend too much time on any one thing so I wasn't bored.*

Suggestions for Interactivity and Activity:

1. Try Chunking: Plan every session/lesson in chunks of time that include opportunities for interaction. Examples of interactive elements include:

    - Discussion: Call students by name and encourage discussion by facilitating student responses to questions and answers. Help learners see new perspectives.

- Debate: Provide distributed groups of students with opposing points of view to defend. Try inter-site teams.

- Presentations: Have students give mini-presentations to each other or to an expert.

- Team Work: Allow time for collaborative group work or paired work.

- Improv: Have teams of distributed students' present class-developed problems back and forth and have the opposing group provide possible solutions.

2. Use an Inquiry Approach: Present an interesting/controversial issue, video, image, article and/or research question to tap into the learner's affective domain.

    - Questioning: Have students respond to guiding questions.

    - Real-world Connection: Bring in content that allows students to solve real-world problems through research, debate, experts, discussion, etc.

    - Experts: Include an expert in the class and have students ask questions, present their research/point of view and interact with the expert.

- Peers: Connect with another class or group of students and facilitate a discussion, debate, mini-presentations, etc between the groups of students.

3. Hands-on activities: Provide hands-on labs, simulations, learning games, demos, activities and opportunities to move around. Allow students to display their learning through creative means and let students post exemplary work online or in their learning environment.

4. Blended Technology-Mediated Learning: Have students interact with a variety of technologies for online research, access to course content online or learning objects, preparing presentations/demonstrations, etc. TeleLearning participants reported a higher level of engagement in sessions that were infused with other technologies. Some supportive technologies include:

    - Interactive whiteboards
    - Computers/laptops
    - Learning Content Management Systems
    - Course content websites
    - Networked/online visuals (video clips, graphics, photos, cartoons, etc.)
    - Online discussion rooms, online communities.

In addition, it is suggested that participants need to be included in the videoconference within the first 5 minutes so that they don't turn away (Knowledge Network Explorer, 1995-2001). Heath and Holznagel (2002) summarize the importance of interaction nicely,

> *Students can develop questions, work in teams on authentic tasks, interact synchronously to gain understandings and interpretations, access primary sources of information, combine other online communication tools, and discuss, compare and present to remote partners. Student-student and student-teacher interaction must be designed into the instruction and continuously fostered by the teacher (p. 10).*

c. Facilitation and Preparation

Fostering interaction is only one of the many skills needed to facilitate a successful videoconferencing-mediated learning experience. Joiner, Silverstein and Clay (1981) state that the role of the teacher as facilitator is critical to the success of interactive videoconferences. These authors continue to explain that students at remote sites are frequently less independent then first thought. Therefore, they argue that skilled facilitators are needed at all remote sites to offer support and guidance, especially in larger classes.

Teachers also need to be prepared to step into the role of moderator and event coordinator. The teacher needs to monitor participant body language, ensure that they are able to see and hear clearly and make necessary adjustments accordingly. Clearly, both the technology and the learning need to be managed within a videoconference. Within the TeleLearning research (Chapter 5), students' were more likely to indicate that they had a good learning experience if there was a facilitator at each site managing the following:

- **Camera controls**: zooming in on the speaker, panning the room, showing a variety of participants and room perspectives with out zooming in too close or zooming out too far away.

- **Sound**: having good quality echo-canceling microphones. Muting the microphones when no one from your site is speaking. Ensuring that participants speak with a confident voice.

- **Session moderation**: preparing and cueing the participants for question/answer, debate and presentations. Managing the interactivity and transitions. Making the other site/s aware of needed technical adjustments or questions/comments –this was usually handled behind-the-scene in an online chat room.

When participants were asked how the videoconferencing session could have been made better often the response was related to the need for better facilitation.

> *The second question was way to long and off topic and no one stopped them at their site. Otherwise it was pretty good and fairly interesting.*
>
> *It could have been even better if someone was operating the camera so that we could see their faces close up when they were speaking –like our site did.*

Other literature confirms that it makes a significant difference to the learning experience when the teacher makes a special effort to use the camera controls to zoom in on participants especially when they are speaking. Otherwise, students can easily lose interest in continuously watching an unchanged screen (Knowledge Network Explorer, 1995-2001).

Facilitating a very active videoconference takes a lot of planning but research indicated that this planning pays off in terms of student engagement and learning. Willis (1994) emphasizes that,

> *A major difference between successful and unsuccessful sessions and programs is prior planning. The practice of "just-in-time" delivery – deciding the hour prior to class to show a video or engage in group activity- will not work if attempted under the conditions of distance education such as interactive videoconferencing (p.20).*

Indeed, to incorporate elements of interactivity and activity teachers must plan well in advance.

Proper planning should ensure that:

1. Students are prepared to be active participants. The expectations and rules governing interaction and activities are clear. For example, participants know how and when to indicate that they have a question or comment.

2. Experts/guest speakers/collaborative partners are prepared to be active participants and/or facilitators. The expectations and rules governing interaction and activities are clear to all participants.

3. Multimedia resources are ready and can be accessed/viewed at all sites.

4. Videoconferencing equipment and supportive technologies (multi-point conferencing unit, interactive whiteboard, online tools, etc.) are tested beforehand and operating properly for all sites.

5. Curricular materials are received and set-up for participants at all sites.

6. The lesson is designed in chunks of varying activities.

7. The camera is programmed to zoom in on participants and the lighting and sound levels are appropriate.

8. All participants understand and employ the protocols and etiquette required for a successful videoconference (eye contact, muting the microphone, eliminating distracting noises, zooming in and out, etc.).

9. A post-videoconference assessment/evaluation is ready to give to participants for collecting feedback.

10. A back-up plan is ready to be implemented should the technology fail.

Good videoconferencing instruction requires careful planning to ensure that participants learn. Heath and Holznagel (2002) caution that,

> *Clear objectives, appropriate structuring of learning materials and activities relevant to learners' needs are necessities regardless of the choice of technologies. If these principles are ignored, then the teaching will fail even if the unique characteristics of the technology are appropriately exploited (p. 6).*

Learning materials and activities must also be in direct alignment with the curriculum outcomes and students' level of understanding.

Research indicates that videoconferencing-mediated learning not only takes longer to prepare for but that it also takes longer to deliver the content (LearnCanada, 2002; RACOL, 2004). Teachers must make every teaching moment count in the videoconferencing classroom. Accordingly, the participants, including experts or guests speakers, should receive a copy of the curricular outcomes expected from each lesson. Supplying curricular information to participants sets the framework for the videoconferencing class and assists in assuring that the content has curricular relevance.

d. Class Size

As reported in Chapter 5, videoconferencing sessions that involved larger numbers of students (more then 18 students) and/or multiple sites (more then 3 sites) had less interaction, less activity and more challenges with regard to technical quality and facilitation. It stands to reason that in smaller classes it is easier to ensure that each student has an opportunity to participate in discussions, present their knowledge, and be directly acknowledged (by name) by the teacher, expert or other participants. Whereas in the larger videoconferencing sessions, one student noted, "there were a lot of people so not everyone got to participate. I noticed someone falling asleep at the back."

Smaller groups had a tendency to be more personal as well and provided greater opportunities to establish rapport. Both teachers and students in videoconferencing sessions involving smaller numbers of participants made observations such as, "we got to know them and associate with them better."

This is not to suggest that larger videoconferencing sessions can not be successful learning experiences. Indeed, there were several successful large-group sessions documented in the research. These sessions, however, required a great deal of planning and facilitation to ensure engaging and interactive learning experiences for all participants.

Tip: Videoconferencing classrooms require a flexible design to support activity and interactivity within a variety of subject areas.

4. Environmental Design

When staff and students at J. Percy Page School began using videoconferencing, they started in a standard classroom with desks in rows and then tried a standard computer lab with tables of computers in rows. Neither of these arrangements proved satisfactory and eventually the program was moved into the library. At that point, the staff realized that a new design was needed and the Global Classroom within the TeleLearning centre was the result.

The reason that the standard classroom and lab did not work was the lack of flexibility. With the furniture and technology "bolted down", teachers were limited in instructional design. Perceiving the importance of activity and interactivity, teachers wanted to move the furniture and the technology around to support a variety of arrangements within a variety of subject areas. A mock trial required a courtroom-like setting; a science session required stations for experiments; a math improv required a large movable whiteboard in the middle of the student groups. Likewise, each teacher/class oriented the videoconferencing unit and associated technologies differently in order to effectively facilitate their learning activities. The standard classroom/lab did not have room to support these additional technologies. The ability to infuse supportive technologies effectively into the learning environment has an impact on student learning. Heath and Holznagel (2002) explain that within flexible, stimulating learning environments,

> *The use of multiple cameras from different angles and the use of various sources such as video display, computer display, and viewing of objects and images can stimulate visual learning opportunities. Multiple visual and audio elements have the potential to engage students in ways that go beyond typical classrooms (p. 3).*

In designing the TeleLearning Centre, the staff created flexible learning spaces. Almost everything including technology, furniture, screens, even walls, can be moved with relative ease and speed.

A side affect of this flexibility was that the students became involved in the design and set-up of their learning space. It was observed that the high school students would often arrive during the class break and set-up the room in their favorite learning orientation. Staff described this process/environment as an "alive" classroom.

The idea that it is important for learners to take an active role in their learning is generally accepted. A flexible classroom where students are involved in the set-up and décor (images, students work, etc.) fosters a sense of ownership and active participation within the learning environment.

Some staff members were concerned about the "wear-and-tear" of furniture and equipment with the constant re-arrangement. At the time, there was no conclusive research to indicate that this was or was not a concern. To date, there has not been any damage to the furniture or equipment as a result of this movement. The school staff feels that the pedagogical importance of flexibility far outweighs the possible risk of damage to furniture and equipment. The pedagogy drives the equipment/furniture selection and placement –this is the guiding principal behind the successful videoconferencing learning environment.

A final note regarding videoconferencing environments involves the competition for space. Videoconferencing classrooms are often high-demand spaces that are continuously booked for students groups. As indicated in the research (Chapter 5), staff members are using (or are planning to use) videoconferencing to support professional growth. It is advantageous to have an additional videoconferencing location, such as a staff room, board room or office that can be equipped for staff professional development.

Chapter 8

Conclusion: A Look at the Future

All I know about the future is that
it is what you make of it.
- Walter Mosley

As futurists and trend watchers have indicated, we are moving away from "fixed" technologies toward more portable, flexible devices connected through global networks and tailored for high-quality, specific applications (Means, 2000). This idea is supported by the substantial growth demonstrated in technologies such as wireless, hand-held personal computing, GPS, broadband networks and also videoconferencing.

As broadband networks spread, and the communications technology sector expands/improves products and services, classroom videoconferencing technologies will become increasingly more pervasive and reliable. More schools will connect to each other and to educational content providers such as universities, museums, science/space agencies, and special experts (Holocaust survivors, artists, politicians, etc.) working together on collaborative projects like the ones described in Chapter 4.

In addition, videoconferencing will at some point merge with wireless, hand-held devices to extend opportunities for interactive, "in-field" exploration and collaboration. For example, envision the scientist exploring a volcanic site while connected to grade 3 students that are learning about volcanoes or the scientist/explorer, connected to a group of Biology teachers, describing the physiological affects while climbing a mountain/ice burg or ascending into space. Astronauts have already connected to classrooms from space so this "in-field" vision is quite probable.

As more educational organizations explore the use of videoconferencing to support teaching and learning, the following 5 themes will emerge:

1. Extended Learning Opportunities and Partnerships: These school-to-content/expert exchanges will continue to support real-world curricular links in the classroom as well as professional learning. Furthermore, videoconferencing links will continue to allow isolated/remote learners to connect to learning opportunities and special services not readily available locally. Learners, regardless of location, will continue to expand their knowledge, skills and attitudes through interactive connections to people, places and events anywhere on the globe. We are only limited by our imaginations.

2. Blended Learning Opportunities: With the addition of video/audio aspects to online courseware (learning management systems), online teachers and students will continue to explore the use of IP-videoconferencing to support interactive learning for distributed learners. Likewise, videoconferencing teachers will explore the use of online tools within their "bricks-and-mortar" based programs/classrooms.

3. Professional Growth Opportunities: For a number of reasons, it is becoming increasingly challenging to have teachers away from the classroom for professional development workshops –and some question the efficacy of doing so. Videoconferencing has demonstrated great potential for providing new opportunities for job-embedded, curricular-relevant professional growth for teachers. We will see this technology used more and more to support professional growth and mentorship programs for teachers, leaders, specialist, etc. Over the past few years professional learning communities have arisen as an alternative method of professional development. Videoconferencing will support and extend current and future professional communities of practice.

4. Administrative Efficiencies: As videoconferencing technology improves and becomes readily accessible, accepted and used, educational leaders will opt for meetings, professional development, interviews, etc. by videoconference. Where face-to-face meetings are not possible or when time and resources are limited, videoconferencing can be an alternative to bringing distributed people together.

5. Research, Assessment and Evaluation: The increased expenditure on technology-mediated programs coupled with a renewed emphasis on standards-based policies/budget alignment has resulted in some interesting questions. Leaders and policy makers want to know if there is a return (meaning increased achievement) on this investment in technology. Consequently, we will see research and development work in the area of assessment and evaluation of videoconferencing programs. In addition, there is a growing interest in research questions such as:

    a. How well do students in videoconferencing-mediated classrooms achieve in comparison to non-videoconferencing classrooms?

    b. How can videoconferencing support the development of staff capacity in strategic areas such as second languages, new curriculum, special needs, learner assessment, and meaningful technology infusion?

    c. How do new videoconferencing-mediated professional growth programs compare with more traditional workshop-type approaches?

    d. How can videoconferencing support the development of leadership capacity?

Rays of light like the Global Classroom program and the new TeleLearning centre at J. Percy Page School represent futuristic learning models to be nurtured and examined. Teaching and learning through videoconferencing (or TeleLearning) is a model that adopts engaging instructional practices within a flexible environment. An environment that is alive with activity, interactivity and real-world relevance. A predominant feature of this innovative model is an integrated array of complementary technologies including Internet-based collaboration tools and resources, projection systems and displays, student and teacher computers and, of course, interactive videoconferencing equipment.

The TeleLearning model offers learners the exciting opportunity for direct involvement with the living curriculum. Learners enjoy actively exchanging knowledge with peers and experts and indicate that this is a "much better" way to learn curricular content. Teachers and students enjoyed their videoconferencing learning experiences. Participants reported that the experiences had a positive impact on achievement and that they had a desire to continue learning this way. In the TeleLearning research 90% of the 204 students and 100% of the 20 teachers indicated a desire to continue to learn through the use of videoconferencing. A vast 92% of students reported an increase in learning as a direct result of the interactive videoconferencing and 87% believe that they will retain the new knowledge for a longer time. Likewise, over 85% of the teachers felt that when the session was well planned and the technology worked well, the videoconferencing event enhanced the students' achievement.

With the advancement of broadband networks and videoconferencing technologies, today's schools will all have the same unique opportunity to support their educational objectives for staff and students through the use of sound pedagogy and robust technology. For those champions and leaders who brave the battle scars and journey down this path, I hope the story of TeleLearning at J. Percy Page, the research results and lessons learned is helpful and supportive of your endeavors.

References (Cited)

Quotations at the start of each chapter found in:
Encarta Book of Quotations (2000). St. Martin's Press. New York, NY.

Advance Broadband Enabled Learning (2004). ABEL: Plug Into Learning. http://www.abelearn.ca/.

Andrews, K., & Marshall, K. (2000). Making Learning Connections Through TeleLearning. Educational Leadership, 58 (2), 53-56. Association for Supervision and Curriculum Development (ASCD).

Andrews, K., & Mitchell, S. (2003). Leading the ICT Race at J. Percy Page School. SchoolNet Magazine, Fall 2003, 4-5.

Barfurth, M (2002). LearnCanada: Final Summative Evaluation Report. http://www.learncanada.ca.

Bates, A.W. (1997). The Impact of Technological Change on Open and Distance Learning. Distance Education, 10(1), 93-109.

Berge, Z.L., and Mrozowski, S. (2001). Review of Research in Distance Education 1990-1999 [Special issue]. American Journal of Distance Education, 15(3).

Blades, D. W. (1999). Basic Skills for the Next Century: Developing Students' Reason, Rebellion, and Responsibility. (English translation) In Luiz Heron da Silva, Seculo XXI: Qual conhecimento? Qual curriculo? Petropolis, Brasil: Editora Vozes

Blades. D.W. (2000). Developing an Ethics of Technological Innovation: Possibilities for Japanese Leadership in Science Education Curriculum Reform. Unpublished summary paper for Japanese Educational Conference July 2000.

Broudy, H.S. (1982, May). What Knowledge is of Most Worth? Educational Leadership. Alexandria: ASCD. 574-578.

Clifford, P. & Friesen, S. (2001). The stewardship of the intellect: Classroom life, educational innovation and technology. In Barrell, B. (Ed.) Technology, Teaching and Learning: Issues in the Integration of Technology. Detselig Enterprises Ltd.: Calgary, AB.

Cole, C., Ray, K., and Zanetis, J. (2004). Videoconferencing for K-12 Classrooms: A program development guide. Eugene, OR: International Society of Technology in Education (ISTE).

Cuban, L. (1982, October). Persistent Instruction: The High School Classroom, 1900-1980. Phi Delta Kappan, October. 113-118.

Gaither, Chris. (2004). Schools in rural Alaska are using Internet video links to bridge the vast distances between students and scarce teachers. Los Angeles Times, November 11, 2004, 1.

Hampel, R., & Hauck, M. (2004). Towards an effective use of audio conferencing in distance language courses. Language Learning & Technology, 8(1), 66-82. http://llt.msu.edu/vol8num1/hampel/

Heath, M., & Holznagel, D. (2002, June). Understanding the Value of Interactive Videoconferencing Technology: Volume 1. Interactive videoconferencing: A literature Review. A Regional Tehnology in Education Consortia National Collaborative Project. Washington, D.C: Regional Technology in Education Consortia.

Giroux, H.A. (1985, May). Teachers as Transformative Intellectuals. Social Education. 376-379.

Holznagel, D.D. (2003). Access and Opportunity: Policy Options for Interactive Video in K-12 Education. Portland, OR: Northwest Regional Educational Laboratory.

Joiner, L.M., Silverstein, B.J., & Clay, M.B. (1981). Independent Study: Route to academic equity for rural high schools. Educational Leadership, 387(7), 578-580. Association for Supervision and Curriculum Development (ASCD).

Knowledge Network Explorer. (1995-2001). Videoconferencing Instructional Strategies. SBC Knowledge Ventures. http://www.kn.pacbell.com/wired/vidconf/instruct.html

Kress, G., & van Leeuwen, T. (2001). Multimodal discourse: The modes and media of contemporary communication. London: Arnold.

Kunz, P. (2002). Students' Acceptance of Videoconferencing in the Lecture Context. World Conference on Educational Multimedia, Hypermedia and Telecommunications, 2000 (1). http://dl.aace.org/1711

Lecourt, D. (1999). The ideological consequences of technology and education: The case for critical pedagogy. In M. Selinger & J. Pearson (Eds.), Telematics in education: Trends and issues. Amsterdam: Pergamon. 51-75.

Lemke, C. & Coughlin, E. (1998). Technology in American Schools: Seven dimensions in gauging progress. Milken Exchange.

Mason, R. (1998). Using communications media in open and flexible learning. London: Kogan Page.

McNally, D., & Speak, K. (2004, November). As quoted in The National Staff Development Council (NSDC) RESULTS, ISSN 0276-928x Oxford, OH. (www.nsdc.org)

Means, B. (2000). Technology Use in Tomorrow's Schools. ASCD Yearbook 2000. Alexandria: ASCD. 57-61.

Rural Advanced Community of Learners (2004). RACOL: Rural Advanced Community of Learners. http://www.racol.ualberta.ca

Schacter, J. (1999). The impact of education technology on student achievement: What the most current research has to say. Milken Exchange. http://www.mff.org/pubs/ME161.pdf

Schiller, J., and Mitchell, J. (1993). Interacting at a distance: Staff and student perceptions of teaching and learning via video conferencing. *Australian Journal of Educational Technology*, 9(1), 41-58. http://www.ascilite.org.au/ajet/ajet9/schiller.html

Sullivan, M., Jolly, D., Foster, D., and Tompkins, R. (1994). Local Heroes: A Guidebook for Bringing Telecommunications to Rural, Small Schools. Austin, TX: Southwest Educational Development Laboratory.

Tennant, J. (1999). Teleteaching with large groups: A case study from the Monash experience. *Australian Journal of Educational Technology*, 15(1), 80-94. http://www.ascilite.org.au/ajet/ajet15/tennant.html

Willis, B. (1994). Distance Education Strategies and Tools. NJ: Educational Technology, 35(6), 5-23.

References (Consulted)

Arnold, T., Cayley, S., and Griffith, M. (2002). Videoconferencing in the Classroom: Communications Technology across the Curriculum. Coventry, U.K.: British Educational Communications and Technology Agency (Becta). http://www.becta.org.uk/leas/leas.cfm?section=7_1&id=1137.

Bates, A. W. (1997). The impact of technological changes on open and distance learning. Distance Education, 18(1), 93-109.

Boyle, E., Anderson, A., & Newlands, A. (1994). The effects of visibility on dialogue and performance in a cooperative problem-solving task. Language and Speech, 37(1), 1-20.

Bruce, V. (1996). The role of face in communication: implications for videophone design. Interacting with Computers, 8(2), 166-176.

Buckett, J. & Stringer, G. (1999) Internet Videoconferencing's 3Ms: Multiway, Multimedia, Multicast.
http://www.ex.ac.uk/pallas/relate/papers/peg99/stringer.htm

Chou, C. C. (2001). Formative evaluation of synchronous CMC systems for a learner-centered online course. Journal of Interactive Learning Research, Summer-Fall, 173-187.

Chun, D., & Plass, J. (2000). Networked multimedia environments for second language acquisition. In M. Warschauer & R. Kern (Eds.), Network-based language teaching: Concepts and practice (pp. 151-170). Cambridge, England: Cambridge University Press

Cifuentes, L., Murphy, K., Davis, T., Gonzales, E. and Edmundson, C. (1997). Cultural Connections: A Model for K-12 Videoconferencing. Paper presented at the 13th Annual Conference on Distance Teaching and Learning "Competition, Connection, Collaboration." Madison, WI, August 6-8, 1997.

Collins, M.P. and Berge, Z.L. (1997). Student Attitudes about Computer Conferencing. Paper presented at the 13th Annual Conference on Distance Teaching and Learning "Competition, Connection, Collaboration." Madison, WI, August 6-8, 1997.

Dimock, K. V. (1997). Building relationships, engaging students: A naturalistic study of classrooms participating in the Electronic Emissary Project. Manuscript submitted for publication.

Eales, R. T. J. et al. (1999). Desktop Videoconferencing as a Basis for Computer Supported Collaborative Learning in K-12 Classrooms. Educational Multimedia, Hypermedia and Telecommunications Conference, at Seattle, WA.

Fullan, M. (2002). Leading in a Culture of Change. Paper given at SchoolNet Network of Innovative Schools Institute. Mississauga, ON. October 5, 2002.

Gage, J., Nickson, M., and Beardon, T. (2002). Can Videoconferencing Contribute to Teaching and Learning? The Experience of the Motivate Project. Annual Conference of the British Educational Research Association.
http://www.leeds.ac.uk/educol/documents/00002264.htm.

Gerstein, R. (2000). Videoconferencing in the Classroom: Special Projects toward Cultural Understanding. Computers in the Schools, vol. 16, issue 3/4, pp. 177-186.

Green, J. N. (1999). Interactive Videoconferencing Improves Performance of Limited English Proficient Students. T.H.E. (Technological Horizons in Education) Journal, vol. 26, issue 4, pp. 69-70. http://www.thejournal.com/magazine/vault/A2038.cfm.

Hampel, R., & Baber, E. (2003). Using Internet-based audio-graphic and video conferencing for language learning. In U. Felix (Ed.), Language learning on-line: Towards best practice (pp. 171-191). Lisse, The Netherlands: Swets & Zeitlinger.

Hearnshaw, D. (2000). Effective Desktop Videoconferencing with Minimal Network Demands. British Journal of Educational Technology, vol. 31, issue 3, pp. 221-228.

Huso, J. (2000). Supporting Remote Communities with a Shared Virtual Classroom: A View of Social Contexts. Journal of Information Technology for Teacher Education, vol. 9, issue 2, pp. 255-267.

Jonassen, D.H. (1996). Computers in the Classroom: Mindtools for Critical Thinking. New Jersey: Prentice-Hall, Inc.

Lake, D. (1999). Reducing isolation for distance students: An on-line initiative. Open Learning, 14(3),14-23.

McAndrew, P., Foubister, S. P., & Mayes, T. (1996). Videoconferencing in a language learning application. Interacting with computers, 8(2), 207-217.

Motamedi, V. (2001). A critical look at the use of videoconferencing in United States distance education. Education, 122(2), 386-395.

O'Malley, C., Langton, S., Anderson, A., Doherty-Sneddon, G. & Bruce, V. (1996). Comparison of face-to-face and video-mediated interaction. Interacting with Computers, 8(2), 177-192.

Pachnowski, L. (2002). Virtual Field Trips through Videoconferencing. Learning And Leading With Technology, vol. 29, issue 6, pp. 10-13.

Papert, S. (1999). Diversity in Learning: A vision for the new Millennium, Parts 1 and 2. http://www.papert.org/articles/diversity/

Siraj-Blatchford, J. and Siraj-Blatchford, I. (2001). Developmentally Appropriate Technology in Early Childhood: 'Videoconferencing' - A Limit Case? AERA (American Educational Research Association) 2001 Annual Meeting. http://www.ioe.ac.uk/cdl/datec/aera2001/paper1.pdf.

Skaalid, B. and Montgomerie, T. C. (n.d.). Providing Quality Education in Remote, Rural Areas. Edmonton: University of Alberta. http://www.racol.ualberta.ca/documents/documents/Montgomerie_PTCfinal.doc.

Stromsland, F. C. (1999). Perceptions of Fourth and Sixth Grade Students, Regarding Their Academic Abilities and Achievement, as Related to Participation in Distance Learning Using Interactive Television. Doctoral dissertation, Seton Hall University, College of Education and Human Services.

Szente, J. (2003). Teleconferencing across borders: Promoting literacy and more in the elementary grades. Childhood Education, 79(5), 299-304.

Thorpe, R. (1998). The Use of Personal Videoconferencing with Special Needs Pupils from Three Schools Serving Rural Areas: A Case of Successful Adoption of New Technology. Journal of Information Technology for Teacher Education, vol. 7, issue 3.

Tuttle, H. (2004). Improving the Student Learning in Expert and Peer-to-Peer Videoconferencing. Paper given at NECC 2004.

Wang, Y. (2004). Distance language learning: Interactivity and fourth generation Internet-based videoconferencing. CALICO Journal, 21(2), 373-395.

Wang, Y. (2004). Supporting Synchronous Distance Language Learning with Desktop Videoconferencing. Language Learning and Technology, 8(3), 90-121. http://llt.msu.edu.vol8num3/wang/

Ward Melville Heritage Organization (WMHO) (2002). Videoconferencing Exposes Students to New Worlds. T.H.E. (Technological Horizons in Education) Journal, vol. 29, issue 8. http://www.thejournal.com/magazine/vault/articleprintversion.cfm?aid=3945.

Wagner, E. D. (1994). In support of a functional definition of interaction. The American Journal of Distance Education, 8(2), 6-29.

Wideman, H. et al (2004). The ABEL Project Final Research and Evaluation Report. York University: Institute for Research on Learning Technologies. http://www.yorku.ca/irlt/reports/ABELFinalReport.pdf.

Wong, J., & Fauverge, A. (1999). LEVERAGE -- Reciprocal peer tutoring over broadband networks. ReCALL, 11(1), 33-142.

Useful Websites

Videoconference Alberta web site is full of tips, articles and an educational community of practice (http://www.vcalberta.ca).

Advanced Broadband Enabled Learning (ABEL) is a collaborative community of Canadian teachers. Note: membership fee to join (http://abelearn.ca)

The American Videoconferencing in Education web site is a 'Digital handbook for teachers and students (see http://www.d261.k12.id.us/VCing/index.htm).

Global Nomads Group is a great site for collaborative projects in the USA. Note: Canadian educators can view projects but can't join them (http://www.gng.org/).

Global Leap is the UK version of the Global Nomads. A lot of great project ideas. (http://www.global-leap.com/)

The Videoconference Cookbook is a more generic videoconference resource with a section designed for K12 teachers (http://www.videnet.gatech.edu/cookbook).

Digital Bridges: A Teacher's Guide to Videoconferencing (http://www.netc.org/digitalbridges/teachersguide/vdeoconferencing.html)

The Knowledge Network (http://www.kn.pacbell.com/wired/vidconf/links.html)

Northwest Regional Educational Technology Consortium's K-12 Videoconferencing web site (http://neirtec.terc.edu/k12vc/resources/research.cfm.)

Appendix A

TeleLearning Research Project: Student and Parent Information
Researcher: Karen Andrews, J. Percy Page High School/ University of Alberta
Location: J. Percy Page High School
Participants: Students and Teachers participating in the Global Classroom Program

Background

J. Percy Page High School is the first school to be connected to Canada's high-speed fiberoptic network (CA*Net), operated by Industry Canada. This connection provides students and staff with the opportunity to connect to peers and experts around the globe. Students in the Global Classroom Program experience a new way of learning that is facilitated through leading edge information and communication technologies. Learning activities include developing a research project, conducting on-line research (as well as other methods), creating multimedia presentations of findings and collaborating with peers and experts through real-time videoconferencing or Collaborative TeleLearning.

The Research Study

Karen Andrews (Researcher and Coordinator of the Global Classroom Program) will be compiling data on the Global Classroom Program, for the purpose of creating a thesis in partial fulfillment for a Master's of Education Degree. This Study will describe the creation and operation of a Collaborative TeleLearning environment and provide teacher and student perceptions of this way of learning. Data will be collected from Global Classroom videotaped events, student and teacher journals, surveys and follow-up interviews. Student participation in this research study is totally optional and they are free to withdraw their participation at any time, no questions asked. Withdrawal from the research study will have no impact whatsoever upon their participation in the Global Classroom program.

All names identifying any participant will be removed from all correspondence project work, journals, surveys and emails. Video segments taken from public events will not include the names of participants. Students will be assigned a pseudonym for the purpose of the research documentation. The school and Global Classroom program is identifiable as this program has had several public events.

Why is this research study important?

The staff and students participating in the Global Classroom program are pioneers in the use of high-speed or broadband videoconferencing to support learning. As network connectivity increases, there will be more schools, school boards and educational institutions with videoconferencing capabilities. This research will provide a description or a 'recipe' for the set-up and operation of a Collaborative TeleLearning environment, and, explore the feasibility of doing so. This research provides an opportunity to share what we have learned, in the Global Classroom Program, with others.

What is required of the participants?

Students within the Global Classroom Program are asked to keep journals of their thoughts and activities while in the program. Students will be made aware that these journals will be used in this research study to gather data on student perception, and that they will be kept, in confidence with names removed, by the researcher. Students will also be asked to complete a one-hour survey, and follow-up interview after the videoconferencing session/s.

How will the data collected be used?

The data collected will be used, within the Thesis document, to provide a rich description of Collaborative TeleLearning –including student perceptions of the program. The results of this research will be used in presentations and written articles for education purposes (may include the use of video clips and photographs)

TeleLearning Research: Student Survey Questions
Introductory comments (given to student participants): The following questions are part of a research study investigating Collaborative TeleLearning within the Global Classroom Program. Your responses are an extremely valuable to this study and will be used to describe the perceptions of this way of teaching and learning. Participation is voluntary and your comments will be kept totally confidential. Thank you.

Question 1: Select the class that you are in from the table below. [table provided according to participating sites/classes]

Question 2: What grade level are you in?

Question 3: Please describe the most recent videoconferencing event that you participated in.

Question 4: What did you think of the videoconference learning experience from a NON-Technical point of view? Please provide a reason for your selection. [5 point scale provided]

Question 5: What did you think of the videoconference learning experience from a technical point of view? [5 point scale provided]

Question 6: What do you think about this technology?

Question 7: What do you think of the teaching and learning methods within the videoconferencing classroom as compared to more traditional approaches?

Question 8: What did you think of the collaboration with distant peers and experts?

Question 9: Do you think this way of teaching and learning should be expanded to other subjects and/or students?

Question 10: What do you think of the Global Classroom room/facility?

Question 11: What skills or new attitudes, if any, did you acquire during the videoconferencing session/program?

Question 12: What, if anything, did you learn as a result of participating in this videoconferencing session/program? Describe any new curricular knowledge that you gained.

Question 13: Did this session/program help your achievement in the subject involved? Please explain your response.

Question 14: Did the program have any relevance to your future? Please explain your response.

Question 15: Please provide any ideas, suggestions or comments for the Global Classroom program.

Question 16: What was the best thing about the session/program?

Question 17: If there was one thing that you could change about the session/program, what would that be?

Question 18: If possible, would you like to continue videoconferencing?

Question 19: What topics or activities should we explore in the future?

Question 20: Please use the space below to add any other comments that you might have.

Sample Post-Event TeleLearning Research
Survey Report

Question 1: Select the class that you are in: (N=52)

[illegible]		
Mr. Summer's 20/30 Global Classroom	10	19.2
Mr. Winter's 10 Global Classroom	1	1.9
Mr. Summer's 10 Global Classroom	18	34.6
Mr. Summer's Social 10AC	12	23.1
Mr. Winter's Calm 20AC	9	17.3
Mr. Spring's Music Class	2	3.8

Question 2: What grade level are you in? (N=51)

[illegible]	[illegible]	[illegible]
Grade 10	30	58.8
[illegible]	[illegible]	[illegible]
Grade 12	9	17.6

Question 3: Please describe the most recent videoconferencing event that you participated in.

- **April 24th Safe and caring schools event**

Question 4: What did you think of the event from a NON-Technical point of view? Please state a reason for your answer. (N=50)

[illegible]	[illegible]	[illegible]
Excellent event	17	34.0
[illegible]	[illegible]	[illegible]
Average event	10	20.0
[illegible]	[illegible]	[illegible]
Very Poor event	0	0.0

Comments:

- **Excellent event**
    - **It was good because of the debates and chances to talk to other students and experts**
    - **We had a wonderful discussion with two other groups on how we can foster a more safe and caring environment.**
    - **It provided first hand knowledge and also gave us individual points of view by people who have experiences on this subject.**
    - **I found it to be very interesting and knowledgeable.**
    - **Several New Views on the topic were presented**
    - **It was only my second video conference and I learnt a lot... over all it was a great experience**
    - **It was a very effective way to practice self discipline in respect to learning, and being able to teach others**
    - **Lots of discussion good speech from Reverend Lang.**
    - **It was quite informative, some really good ideas came out of that conference that we never could have come up on our own necessarily.**
    - **Very encouraging for the future. Students have a positive outlook on life, and a good plan for the future.**
    - **Because it got a lot of stuff off peoples minds and we got to talk a lot.**
    - **This event was a good way to interact and share different research with people around the world.**

    - It was alright, except for the people in Toronto were acting really weird.
    - It was cool to interact with people so far away
    - Well set up, very educational great use of technology
    - I thought it was very interesting to hear other students' points of view
    - We got to hear other people from across the country talk about landmines
    - It was neat that we could talk to people at the other end of the country and see their faces
    - It was an interesting topic and a highly interactive session
- Good event
    - It was well presented in the conference
    - Good but they talked too much and I said nothing.
    - There was a lot of people participating
    - It was fun and very interesting
    - Learn anything that I didn't know.
    - It was good because I got an understanding of what others think of about the issue.
    - The people in Toronto were singing because they didn't think their mike was on, and that was quite 'scary'. Besides that it was great.
    - Because it was an informative event on how people see the school events and happenings
    - I wasn't really sure what the land mine issues were before we did this
    - There were lots of things that were accomplished.
    - We got to hear opinions from a lot of different people.
    - It was hard to be heard.
    - Got to exchange information about students across Canada.
    - The people in Ottawa were nice, and it was cool to see media personality wanting to interview us
    - A lot of problems with the sound otherwise it was great.
    - It was interesting and neat to talk to people from Ottawa
    - Interesting and fun.
    - It was fun and interesting.
    - It was fun and something new.
    - Because we were able to meet and discover how it is in a different part of Canada
- Average event
    - Our groups were put together with thought and insight, and it was somewhat fun.
    - The technology was not as good as last time.
    - It didn't seem very important in term of what we are supposed to be learning
    - It was pretty entertaining at some points and I got to miss classes.
    - The sound was too low from one of the sites and the camera was never on the students.
    - There wasn't much understanding about the 2 events (things we were trying to prove)
    - I would've liked it better if the conference had been more student-controlled so that we could have interacted directly with the other students. I think this could be a very useful way of learning if used effectively.
    - We didn't understand what the other community was trying to prove and they we not as prepared.
    - Good learning experience
- Poor event
    - I didn't get to interact with other students or other people. The microphone was taken over.
    - We did not get to talk to the expert; we only got to talk to him once.
    - Not much was established in the way of the project we were supposed to be doing, and we didn't get much of a chance to interact with the other students.

Question 5: What did you think of the event from a technical point of view? (N=49)

[illegible]	[illegible]	[illegible]
Excellent event	16	32.7
[illegible]	[illegible]	[illegible]
Average event	7	14.3
[illegible]	[illegible]	[illegible]
Very Poor event	0	0.00

Comments:

- **Excellent event**
  - **The fact that technology let us see people from all over the country was amazing. It really made a difference being able to see the people that you are talking too.**
  - **The technology was very well presented**
  - **Everything was set up fast and easy... there were very few video and audio problems and if there was they were rarely on a our side**
  - **Because of all the cameras and viewpoints and different programs used**
  - **It was set up very well, lots of high tech equipment**
  - **The sound, the images were very clear and it was interesting using the new technology available to do something like this.**
  - **I liked the PowerPoint presentation**
  - **This conference allowed us to use the computer cameras and mikes to talk to people half way across the country. We were able to use the highest top of the line technology to interact with students in Toronto.**
  - **With the help of Shaw the tech was cool but we need more advance stuff which will come in time**
- **Good event**
  - **The sound would sometimes kick out but other than that it was fine**
  - **There are always a few unavoidable technological glitches and minor problems that need to be worked through.**
  - **I thought it was smoother and a lot more efficient than the conference last year.**
  - **Very good only that sound quality was not the best at times speakers would have to repeat themselves. The picture was very good thought.**
  - **Taber was a little unprepared technically, other than that everyone was heard and there were minimal to no glitches.**
  - **It was good to talk to the other students around Canada. It was good to hear what the other students had to say.**
  - **Some problems with sound, most of all the technical aspects worked as planed**
  - **It was good except for Rideau's sound it was hard to understand what they were saying.**
  - **We had troubles with some hearing of one of the schools.**
  - **I don't know much from the technical aspect but I thought the video of the different people was interesting.**
  - **There was one school that was very difficult to hear**
  - **It was interesting because we could see the other students and talk with them even though they were on the other side of the country.**
  - **Lagging + Tech. Problems**
  - **Nice to have a videoconference, more interactive**
  - **It was cool to talk to people so far away**
  - **Cool and different**
  - **It was cool, exciting and new.**
  - **Had some audio problems from their side.**
- **Average event**
  - **Our tech was working, but the other's wasn't, and that doesn't help when you're trying to talk with them.**
  - **The video from the other schools was a bit slow.**

- Audio was cutting in and out. Video was choppy.
- You could not hear all the time
- It was really good except the sound wasn't working very well but it has very good potential if that could be improved
- We couldn't hear sound

Question 6: What do you think about this technology?

- I love it - it was a great
- It is amazing and up-to-date. The fact that we have this at our disposal is also very important. Many people would not have a chance to use this technology and I for one feel very fortunate.
- It is a big advantage to the learning of students going to the business world.
- The technology that we are using is excellent. The high-speed network that we are using though should be checked because I find that the proxy doesn't work more than it works. The computers slow down and that can get annoying when doing research for a topic. It doesn't help learning when you wait half an hour to download a site.
- I think it's great that we have the technology to talk to people across the nation to discuss many topics and issues to get a view point of someone that lives in another part of the world.
- The technologies we utilized were extremely interesting, and easy to learn, thanks to such great teachers.
- One of the disadvantages with being technologically advanced in this class and trying to keep up to date with the leading edge of computer software and hardware is that there are unforeseen problems that cannot be avoided. This experimentation, although beneficial, can take away from the 'living room feeling' of a video conference when sound packets go missing, or the visual portion of the conference temporarily goes down.
- I think it is very interesting and in the future I think it should be used for social studies as well.
- I think this is really cool technology in which we are able to see and talk to students around the world and are able to discuss a variety of topics or base it around one. One can get a great amount of information from this because you get such a great number of different views on a subject.
- I love it. It allows us to connect with others in a way that was never possible before in a classroom setting. We are able to receive the viewpoints from students around the nation, and even the world! The technology is relatively glitch free and is super fast! Videoconferencing was one of the highlights of my final year here at page.
- I think this technology is pretty cool, we can talk, face to face, with other people around the world; that is, IF their end is receiving our signal and vice versa and so on. If used correctly, this technology could help with the learning experience.
  It's good.
- I think it's a good way to interact with other schools through technology.
- I love it because it's very easy talk and fun and how talk on computer, the way that was done.
- Very efficient
- I think that this technology is going to be leading us in the future and we need to use this more to communicate with people in further countries.
- It's more advanced and faster.
- This technology is useful in presenting information on something
- This technology is amazing. I think that it is incredible how we can talk to people in other provinces with up to date, flash, speed of light connection and video.
- Its really interesting how people today in different provinces, even countries can communicate through this streaming audio and video, and I am sure that in a couple of years this technology will be able to be used in many more things, some of them possibly to benefit mankind.
- It was great
- A good way to learn for the new tomorrow

- I like it because we are able to get information from sources all over the world without leaving our home.
- It was fascinating to see the applications of the technology and what we could do with it
- I think that it is neat that you get to talk to people from around Canada and get to see there picture. It is also a good way to get information.
- I think it is a great thing for this school to have as communication is vital in today's world.
- I think that it is useful for us students to talk to people from other provinces to see their opinions on different issues.
- I feel it's a great thing for the school to have a way to communicate so easily, since communication is a great learning tool.
- I think it is great
- I think it's neat and it could be a great learning tool if improved and used effectively
- It is very high-tech and interesting to use
- I think it is very neat and informative and this technology should be given to all students if the chance occurs.
- It's a giant step into the future
- It's great technology to be able to talk to and see others thousands of kilometres away.
- Nice to have at school
- It is pretty unique and interesting
- I think it's really nice to see this type of technology bring different people from different places together.
- I think that it is great the way that our technology is advancing. It allows us to communicate with other people in the country.
- I think it is very interesting and a great advance in communication
- Different.
- New, cool, exciting, and it has good potential. Needs some work.
- It's cool because it opens up new doors, we can do more things(ex. stuff with other cities)
- I think it is very good because things can be done easier without leaving the school or home

Question 7: What do you think of the teaching and learning methods within the Global Classroom as compared to more traditional approaches? Please provide reasons for your selection. (N=50)

[illegible]	[illegible]	[illegible]
Much better	28	56.0
[illegible]	[illegible]	[illegible]
The same	4	8.0
[illegible]	[illegible]	[illegible]
Much worse	0	0.00

Comments:

- **Much better**
  - **More freedom in what we do in the class**
  - **Less restricted, and we always have up-to-date information**
  - **There is a much more relaxed, learn at your own pace and I really like it. There are fewer students which means that they get more one on one with the teacher**
  - **It's easier to learn when you are in a relaxed and comfortable setting.**
  - **In global classroom we have a more relaxed learning environment in which we can actually work at our own pace (as long as we do a good job) I think it's great that we get to use this technology to do these videoconferences. For one can get points of views from all kinds of people from around the country or world.**
  - **More one on one interaction; we are forced to learn on our own (good thing) and can therefore form our own opinions instead of being forced into a societal mould.**
  - **Because you can learn all the stuff by yourself and can ask the teacher about the parts that you don't know about and the teacher will help you**
  - **We use computers**
  - **It's more interesting**
  - **It is better because the teacher makes the students more independent and students learn more when they work on their on and they pay more attention to the work at hand.**
  - **In the Traditional classrooms you have a teacher who has spent their life learning a subject and teaching it to use, cramming it into our young non learning brains and expect us to know it within a few days...Global Classroom allows you to get hands on with all the technology available in the school. The teacher gives you an assignment and you have to use the computers, programs, etc. to receive the necessary answers and info, also it makes you talk and get to know the different students within the classroom and get to know everybody.**
  - **We don't have to supply any of the traditional school supplies for this class, which is nice, and I find the internet on the computer to be very beneficial to my research in different areas.**
  - **The small class has advantages to the efficiency**
  - **Way more fun. I don't get bored and fall asleep.**
  - **More hands-on, and we don't get bored as fast.**
  - **You get everyone's point of view**
  - **I think that this is way better then sitting in a class room and discussing the ideas this was much more interesting to do**
  - **Interaction between people and places is much easier, with access to the computers there is a limitless source of information on any subject at your fingertips**
  - **You get to see if the person is sincere in what they are talking about because you get to see their face.**
  - **Its not a regular classroom environment, its fun and exciting and educational at the same time**
  - **It's good letting the students be independent and do their own work.**
  - **Closer interaction**
  - **More interaction with outside resources.**

  - **Easier to write on a computer, and its more interesting.**
  - **It goes faster and you can see everyone that you are communicating with.**
  - **You would be able to learn not only from teachers/people in your school but from people all over the country or world**
  - **Interaction between great distances and different people and cultures.**
- **Better**
  - **Because it is a more relaxed environment**
  - **It is less structured than other classes to provide ease of movement between topics and can better provide for the needs of children today.**
  - **I feel that I am more suited to individual learning.**
  - **More flexible and more information to choose from.**
  - **As said, if used correctly, this technology could be extremely beneficial to teachers who don't have the experience, and perhaps to students who have those teachers without experience.**
  - **It's a little more interesting.**
  - **Because its more self involvement and less input from the teacher**
  - **We learn more about computer and I did than I know.**
  - **More fun use of technology**
  - **Its fun comparing to other classes, we get to have fun time here.**
  - **Students are able do hands on stuff instead of hearing the teacher talk about a subject**
  - **It allows us to share opinions etc. to people who may have different ones so that we may better understand what is going on in the world.**
  - **I think actually getting to talk to other people is useful because students should really get involved with what they study.**
  - **More information can be accessed easier**
  - **It's something different, so it holds the students' attention better**
  - **Because we can interact directly with others who are doing this**
  - **You get to interact with other people**
- **The same**
  - **It's not really any better than anything we would learn in class**
- **Not as good**
  - **Don't really learn anything new**

Question 8: What did you think of the collaboration with distant peers and experts?

- **I think it is good**
- **It gave everyone an idea of the people that they would be working with. Everyone always had something to say or to do. No input by one student was better than the other.**
- **That they know what they are doing and what to do if there is a problem with the computer.**
- **It is very helpful because, when you collaborate with others in different parts of the country, you receive many new views that may change your view when you see the reasons different people think different things.**
- **I think it's great that we can hear an opinion that doesn't live in our area and who will have many different viewpoints.**
- **It is not as effective as if they were actually here, but it was interesting.**
- **It's amazing that more people are not able to experience the kinds of conferences that we are in every day settings. Having access to experts within fields that we are learning about it incredibly valuable and an asset to our learning on those topics, because these are people who have been able to gain years of knowledge that we could not necessarily gain ourselves in a short window of time.**
- **I think it helps provide a lot more good opinions about issues and makes you realize how different cultures have completely different opinions.**
- **It's excellent for you can hardly ever get this type of learning in any classroom environment.**
- **I found it very enlightening. It helped to break down physical, as well as cultural barriers. We were given insight into the lives of our peers, which gave us a dozen**

different ways to look at the issue we were discussing, instead of just the viewpoints of our classmates. Learning from the experts was a definite bonus. What better way to learn about a topic, than to have someone who knows it inside out to collaborate with you and share their life? This class is much more personal.

- **The peer collaboration was great, because we got to see other people outside Alberta doing some awesome music works. If we actually had an expert, in anything on the other side, I'm sure that it'd be great too!**
- **It's great to hear other peers' ideas.**
- **I think it is cool because we can learn other peoples values and viewpoints on different subjects**
- **I made a web site.**
- **Yes**
- **Peers are able to get together into groups and present their projects**
- **I think the collaboration with others was very good. We got to know them and associate with them better.**
- **I liked hearing what the other students had to say when we did the safe and caring schools event**
- **It was good. They thought lots about different programs such as CNET3**
- **In the 'Safe and Caring Schools' video conference, I really liked to see how our school could bring provincial MLA's, members of our community and citizens of Lethbridge, and Toronto, so we could discuss and agree upon some possible solutions in stopping community violence**
- **It was good to get others views**
- **The good ideas show how other students are alike**
- **I think its excellent how this piece of technology can bring all types of people together.**
- **I think that this is very neat talking to all these people from all these different places at one time it was very educational.**
- **It was very interesting to see what other students in other parts of the country thought. It was good to get different points of view**
- **I think that the collaboration with people from across Canada because it lets you know what life is like there and how people in other places are affected.**
- **I thought it was a very good thing to do as again, it allowed us to see and understand what others are thinking and give us an insight to what we can do to solve problems in the world.**
- **I thought some of the thoughts they had on the issues we were talking about was informative and very helpful.**
- **I thought it was good to hear what they thought**
- **I liked talking with other students getting their point of view on everything, to see what they think**
- **It really made me appreciate the technology**
- **The collaboration was very good because the people are very smart and have deep insights.**
- **It's very good**
- **The opportunity was neat and very intriguing and the chance to have interaction across the country is very interesting.**
- **It was excellent**
- **It was a good experience because we got to see what other students from schools in different provinces were like.**
- **It was interesting**
- **It was different**
- **I think it's great to see people holding different roles in our community come together using technology.**
- **You can see them.**
- **Exhilarating**
- **Cool. Pretty exciting prospects and potential.**
- **It's cool because you can talk and see the people from different cities, communicate and show projects.**

Question 9: Do you think this way of teaching and learning should be expanded to other subjects and/or students? Please explain your answer. (N=51)

[redacted]	[redacted]	[redacted]
Yes	50	98.0
[redacted]	[redacted]	[redacted]

Comments:

- Yes
    - **To some extent much of what goes on in the Global Classes should be brought into other classes to help with students who don't respond to traditional styles of teaching.**
    - **Because the students would be more enthusiastic about coming to class and wouldn't always be moaning and groaning all day**
    - **Social should be extended to this section because it could help the subject enormously. Without the hindrance of outdated text books we could learn things that didn't happen 30 years ago we could learn what happened 30 years ago and today.**
    - **This could be utilized in other classes like social and we could conference with other people on current news topics and other social related events.**
    - **However, whether it is feasible or not depends on the subject.**
    - **It is an amazing asset to the education system**
    - **I think that it would be very useful for Social Studies but I don't think it would be as useful in math or English.**
    - **Most definitely it should be available to all students for I believe one can learn better through just researching and then discussing with other's whom might have a completely different view on the subject.**
    - **Except perhaps Math, but any subject that has to do with discussion and opinion, definitely! Social and English are perfect candidates for this type of technology. With Math, you could set up a web forum to ask for help with questions perhaps.**
    - **If used correctly, the global classroom could greatly expand the learning experience.**
    - **It would expand on the ideas of students at your school.**
    - **It's more 'hands on' learning and this way we learn more**
    - **If we could learn this way with other classes like Math, Social Science and English we would learn a lot better because we could get help with the stuff that only we don't understand which would make us learn more efficiently**
    - **Computers are the future.**
    - **It's more interesting and doesn't bore students**
    - **Because some people don't know anything about computers so they will learn it or net.**
    - **Students will enjoy much more**
    - **I think that it should be yes and no because there are some things in which the teacher has to help you in and being independent all the time is not a good thing.**
    - **Other students would to love learn it because it's basically all computer and you learned different stuff.**
    - **Because it would make the classes more interesting**
    - **Because this way of learning keeps you doing something, not sitting there falling asleep listening to some person babble on gibberish because you dragged your but out of bed to come to school, half asleep.**
    - **I find this way of learning to be more 'hands-on' which I find to be more interesting, and would make me want to come to class more.**
    - **It's very effective**
    - **It helps for expanding the knowledge to others**
    - **I would probably pick up a lot more information and get better grades.**

- Students would benefit from this teaching approach because they wouldn't get as bored with it.
- It makes students actually be excited about the work
- Because this educated me a lot about the topic
- The technology makes teaching and learning much easier and enjoyable
- This could help every subject by getting experts to come in and talk to people
- More information can be provided to all students.
- I think that if you want kids to learn then you have to make it entertaining and the learning like this is fun and interesting and you actually do learn so it's all good!
- More information can be retrieved through the technology available in the Global Classroom
- It's not as boring
- It's something different, so it makes things more interesting, which I'm sure the majority of students would welcome compared with the traditional way of learning, which is listening to a teacher talk
- Students understand more when there is an environment like this.
- It is very direct
- This makes you want to come to class
- Students get more information from different sources from more than just Edmonton.
- More interesting
- Some subjects would be more interesting
- You can learn a lot of different things from different people
- It would make learning much easier, and more interesting.
- Because it allows you to interact with a number of different people
- It brings people closer to understanding each other.
- This is a great experience and students can learn a lot if it is widely used and effectively.
- Opens new doors in the way of learning in the way that we can go to different places around the country and see what goes on over there
- But only sometimes to have an understanding about other countries around the world

Question 10: How did you find the Global Classroom room/facility? Please state the reason for your selection (N=50)

[illegible]	[illegible]	[illegible]
Excellent	17	34.0
[illegible]	[illegible]	[illegible]
Good	14	28.0
[illegible]	[illegible]	[illegible]

Comments:

- Excellent
    - **It was a comfortable and friendly atmosphere.**
    - **It is a very good spot because it is not a hard room to find plus it is spacious enough to more around in**
    - **COMFORTABLE CHAIRS!!!!!!!! Nice big clear computers.**
    - **It is a very nice room with a very open area so it doesn't feel as crowded as a normal room would.**
    - **We are very fortunate to be able to video conference from our own school. None of the other sites have this luxury, and it's great to FINALLY have the systems to do it! :0)**
    - **Great teachers and excellent access to technology and other sources.**
    - **It was big enough not to be crowded, but small enough to be personal. The set up was wonderful for conferencing, except for the lighting which could use some work. The technology is lovely!**
    - **Awesome**
    - **It is great - Mr Summer is a cool teacher he was there to lead the way if you needed help and if you wanted to learn about another program he told you how to use it or if you didn't understand a part of the project he would help you out**
    - **The global classroom had up to date technology and computers available for the entire class.**
    - **The computers are nice and fast. The only thing I would change, though, is the small size of the class-it's really cramped in here.**
    - **Kind of cramped but still good**
    - **Nice and fast computers**
    - **Perfect size**
    - **It has very fast computers, and a nice decorating scheme, but I would like to see the classroom size increase so we aren't so squished.**
    - **The computers are great and the screens are nice and big**
    - **Cosy**
- Very good
    - **Tech is very good but room is a little small**
    - **The room has very good computers and the internet is almost as fast as changing channels.**
    - **The room is kind of small**
    - **We need more computers and a big room**
    - **It was more fun than my other classes.**
    - **I learned lots of stuff on computer and got a bit of experience to talk in public**
    - **Every thing was excellent but we need to check the attitude of others**
    - **The technology was top notch however the room was a little crowded**
    - **But it should be a bigger room as it is very crowded.**
    - **I think it could be larger because a lot of kids want to get involved with it. But as for the idea of the global classroom I think it is wonderful that we can learn things from people all over the world.**
    - **They're much better computers then the ones in the rest of the school, but it'd be better if it was a bigger room**
    - **Well organized**
    - **Good room. A little on the small side. Everyone could see the screen**
    - **It's cool but its kind of small**

        - **Had state of the art equipment**
        - **Clean and roomy.**
        - **It was good, but things were messed up. It needs to be fixed and then it will be good.**
        - **Awesome computers, close environment.**
    - **Good**
        - **It was a high quality classroom, but there weren't enough computers for everyone. As a result, some people dropped the class.**
        - **It was okay, I would say more average than good. It wasn't poor, b/c we did have the big screen, but it wasn't too good either, because we all had to be cramped into one little space.**
        - **It was good, but a little small.**
        - **It was good however the room was too small, and the amount of people in the class did not fit the amount of computers**
        - **It was not too bad...it was a little to small**
        - **It was only good because the room was very small and people felt congested in there. Other than that, the technology and atmosphere was very good.**
        - **A little small**
        - **Except for the fact that it is very small and cramped**
        - **A little small**
        - **Good because of the technology, but also poor because of the space (there is none)**
        - **It's too small**
        - **Kind of small**
        - **It's to bad it wasn't bigger**
    - **Poor**
        - **Not enough computers for everyone**

Question 11: What skills, if any, did you acquire during the Global Classroom program?

- **The skill of forming my own opinion on various things**
- **I found more interesting methods of searching for information, and I also had a better understanding of how to utilize the technology at my disposal.**
- **How to use technology to further my education and be able to make a career out of it.**
- **How to surf the web. Webpage authoring. Research ability. Presentation and Design.**
- **I learnt how to make WebPages and create basic 3d images and how to research a topic really thoroughly.**
- **I acquired a much better understanding of computers, as well as how to use many different types of software.**
- **Self-disciplined learning, and being able to learn through teaching on a very deep level.**
- **I learned how to search much more efficiently on the internet and how to use PowerPoint and Microsoft front page.**
- **I've learnt how to use a 3d editor, how to create video's using adobe Premiere, and presentations using PowerPoint slideshow.**
- **SO many! Technologically, I learned how to design a web-page, create 3D animation, edit videos, create presentations with power point, create web forums, etc... I also learned many personal/interpersonal skills. How to work as a team and collaborate, patience, how to teach, how to accept instruction from peers without feeling demeaned, etc... We all learned how to learn together. We had our scraps, but we learned to get through them. Valuable, valuable skills that will carry on throughout our lives.**
- **More computer learning**
- **Learned how to use macromedia flash and power point.**
- **I acquired the skill of initiative and how to do things in different ways it also gave me different viewpoints on different things**
- **Web site design.**

- **I gained a lot of skills from this class...I learned how to use the computer more efficiently as well as learnt to work with new tech,**
- **How to make web site in the child labour.**
- **Web page design**
- **I learned how to use different programs like flash and Paintshop. I also learned that there is a lot of advanced technology that can be used but very rarely is.**
- **How to make web sites more creative.**
- **Researching, PowerPoint**
- **The skills to be able to turn on a computer, use programs that allow you to digitise a video, make a flash screen animated movie, a PowerPoint presentation, and most of all be able to create on of the most recent and popular WEB PAGE DESIGN**
- **I learned how to use Adobe Photoshop, FLASH, and the internet to complete my projects and research. I liked the variety of things I can do with my projects using the computer**
- **Html and other computer apps**
- **The ability to type faster and more efficient**
- **I learned some webpage design techniques, how to play Euchre and made a few animations (bad ones).**
- **I learned many skills such as typing, web design and how to produce a video using FLASH.**
- **I acquired many skills.**
- **Learned how to develop great people skills**

Question 12: Was this program of any value to you? Please explain your response. (N=29)

[redacted]	[redacted]	[redacted]
Greatly valuable	13	44.8
[redacted]	[redacted]	[redacted]
Not valuable	2	6.9
[redacted]	[redacted]	[redacted]

Comments:

- **Greatly valuable**
  - **I became more understanding of the computers and how to use them.**
  - **Improved my web skills, And It improved my research and presentation skills**
  - **I learnt many new skills that interest me and that I find fun. It is a very unique course because there is nothing that lets you get as interactive with the world as this course.**
  - **Self disciplined learning has helped me to excel in my other courses as well as this one. Being able to learn from experts is also a huge perk to our classroom setting.**
  - **I'm planning on going into a computer programming course also helped my computer skills.**
  - **Learned technology skills, created strong bonds with other students.**
  - **Global Classroom gave me the skills needed to be able to use computers and their programs**
  - **I learned many new computer skills, and specifically better tying skills that will be of great use to me later on in the 'high-tech work world'**
  - **Html and other computer apps**
  - **It will help me with my communicating skills**
  - **It was valuable to me because I was able to interact with a lot of people in many different 'walks of life'**
  - **I learned a lot**
- **Valuable**
  - **I think I learned how much Alberta students are different from Ontario or Newfoundland students**
  - **I now know how to use the internet more to my convenience.**
  - **The computer skills that I acquired came in very handy in other courses.**

- **I can use computers and I have different point of views on all the topics we discussed in class and during conferences.**
- **Not really**
- **I learned some new things about people and technology**
- **I learned some**
- **It taught me a lot about technology and how it can be used**
- **Yes, learning about net.**
- **To me it was valuable because I learned a great deal from this course and I might want to pursue a career in the field of technology.**
- **Yes, I learned lot of stuff**
- **It will help me with other projects in other subjects**
- **Let me relax and learn something at the same time.**

Question 13: Did the program have any relevance to your future? Please state your reason. (N=27)

[illegible]	[illegible]	[illegible]
Very relevant	10	37.0
[illegible]	[illegible]	[illegible]
Not relevant	5	18.5
[illegible]	[illegible]	[illegible]

Comments:

- **Very relevant**
  - **Taught us about current events, and how to use technology to its full capability**
  - **Yes... I plan to go into a computer course and this gave me a lot of skills I would have wanted.**
  - **I have been able to teach myself, which becomes a very important skill later in life. Also learning to use the technology we have in the class has been very useful in the 'outside world'....very valuable!**
  - **I'm going into a computer related course.**
  - **The future is technology. These skills are going to help, even if I don't get a technological career! Also the interpersonal skills.**
  - **Computers is my future**
  - **It had a great amount of relevance to my future, because I've learned some crucial computer skills that will be of value to me when I'm trying to get a job, as our world is becoming very 'high tech' and technological.**
  - **Because it helps me with what I want to take after high school**
  - **I was able to learn to type faster, and use office programs that I'm sure will be of value to me in an office job in my future**
  - **I would like to go to Berkley and this would be a good reference**
- **Relevant**
  - **I think it will help me become a better person in general**
  - **I can use the lessons that I learned in this class to help better my future life.**
  - **I want a career in some sort of computer type of business.**
  - **I have a better understanding of how fast technology moves.**
  - **I'm am going to go into computers when I'm done high school and this gave me some knowledge of computers**
  - **I am going to be a automotive mechanic so I will need to know how to use computers and maybe start my own web page to get customers at the start when I have my own business**
  - **Yes, because I like neat and I learn anything about it.**
  - **I won't have any difficulty in making web sites**
  - **I'm not to into computers to make it my future job. Just a side knowledge to use.**
  - **I plan on getting a job in the field of technology and communications.**
- **Not Relevant**
  - **I am not going to be taking any computer courses in university.**
  - **Not really**

    - **I'm not quite sure yet what I'm going to do in my future so I have to see what I might want to do.**
- **Very un-relevant**
    - **It has no affect on my future**

Question 14: Please provide any ideas, suggestions or comments for the Global Classroom program.

- **Get more of an organized plan before the program begins**
- **This is an excellent program for helping people to understand how many of the systems on a computer operate, and also the video conferences are great for forming an opinion on a subject.**
- **Put up maybe a little more restrictions for those that are joining the 20/30 course. It should be made like any other course where you must go through the 10 course in order to progress into the 20/30 course.**
- **The only thing that I might change is the number of conferences that we had... personally I would have liked to have a few more on different topics.**
- **Get a larger area. If a large enough area cannot be found, at least come up with a system for rotating people around the computers.**
- **More video conferences for the students in the higher level courses (global classroom 20/30). Maybe we should utilize a wider variety of software programs...that would help to make the course a little bit more interesting. I think using the 'chat-room challenges' more often with all of the classes would help, and trying to appeal to a larger range of students in the school rather than those who are just interested in the technological aspect of the class.**
- **Try to get lots of different countries involved in video conferencing.**
- **Create a curriculum. A flexible one, maybe a pick and choose curriculum. I found that occasionally I was lost as to what to do because of a lack of assignment, or because the few technological devices we had (advanced technological such as Lightwave, Premier) were constantly dominated. I think it would be good to set up a rotating station thing where a group of students learns one thing for a month or so then rotates to another of their choosing. That way no one is left out of the benefits. Although we learn on our own, it is important that there be instruction on how to learn these things we have. Not to say there was none, but perhaps a little more. Have some student instruction, etc... All in all, I feel I benefited very much.**
- **Good class, needs more computers or less students**
- **I think that global class room should be spread out into the other subjects like Math, Social Science and English**
- **It's ok.**
- **Bigger classroom**
- **I love it.**
- **Global classroom is a very interesting classroom**
- **I think that there should be more videoconferences and to teach the students how to research things and how to use different programs.**
- **If we can play games we can chat too.**
- **More computers in the global classroom**
- **More video making, or animations**
- **The teacher should be stricter and make sure the students are actually on task, and doing the proper assignments.**
- **It's all good**
- **It's good**
- **Maybe an international video conferencing program.**
- **Bigger classrooms**

Question 15: What was the best thing about the program?

- **The other students and Mr. Winter**
- **The learning was set at our pace.**
- **That you got to work at your own pace instead of being forced to something in such a rush.**

- LESS RESTRICTIONS ON LEARNING
- **The only relaxed and unrestricted atmosphere in this class.**
- **Being free to do my own thing, and utilize class time the way I feel best.**
- **Being able to teach others about what we learned and also learning through the open debates.**
- **The video conference discussions.**
- **The videoconferences.**
- **Videoconferencing. We all groan about preparing for them, but at the event it is always worth it. Also, the relationships I developed with both students and teachers.**
- **The use of computers**
- **The videoconferences**
- **The computers because people keep saying you will need to know more about computers now that technology is moving so quickly**
- **Using computers**
- **It was a fun learning experience**
- **The net.**
- **To talk to people and see people in different cities**
- **The best thing was learning about the new technology and interacting with people across the country.**
- **Videoconference**
- **Being able to do hands on work instead of writing notes**
- **Videoconferencing, and Web design**
- **Meeting new people in other provinces.**
- **The videoconferencing**
- **Less students to put up with**
- **The focus on using the latest technology.**
- **Being able to talk to different people in Canada**
- **It was cool and fun**

Question 16: If possible, would you like to continue in this program? (N=27)

[illegible]	[illegible]	[illegible]
Yes, I'd be very interested	14	51.9
[illegible]	[illegible]	[illegible]
No	4	14.8
[illegible]	[illegible]	[illegible]

Comments:

- **Yes, I'd be very interested**
  - **I love this class I think I would because there is still more to do and learn**
  - **Because it is very important to get a job this day in age.**
  - **I have enjoyed this program and plan to take it again next year.**
  - **I plan on coming back next year for global 30**
  - **I may just come back... watch out...**
  - **If only I could....graduation!**
  - **It's been three years. Why stop now?**
  - **I would like to take part in this program till I' m out of school**
  - **Yes**
  - **I'm very interested in continuing in this program. I look forward to many more video conferences, in which I can gain more knowledge and understanding of different issues.**
  - **Very much**
  - **To see how the program turns out**
- **Yes**
  - **I would, but I am leaving High School.**
  - **I would like to take it next year.**
  - **It's ok but I have better things to finish**

    - **It would be interesting doing more advanced things in this program.**
    - **Because this class is fun to have to come to after the boring one's such as English, Chem., Socials**
    - **I'm thinking about it**
- **No**
    - **I'm in grade 12 and am I graduating therefore I will not be able to**
    - **I have to take info com -20**
    - **I can't seem to find any openings in my schedule.**

Question 17: What topics or activities should we explore in the future?

- **Have more projects and conferences and use more topics like abortion and etc.**
- **More conferences and many different other subjects. They were the most interesting.**
- **On how to help people in a third world country?**
- **More current events that affect the country. AND MORE VIDEO CONFERENCING**
- **I think that the activities we have lined up really work well and we should just have more conferences.**
- **Problems with the ethics and troubles of technology should be examined, as well as the benefits.**
- **Whatever the students at the time desire to cover. Current events topics that have a historic undertone are very interesting to learn about, but you MUST remember that this course is designed to be centered on the STUDENTS...let THEM decide at the time that they want a video conference. That will make the learning more interesting for them.**
- **I think Safe and caring schools should be revisited in the future also should North America adopt a common currency.**
- **More 3D. More conferences. Students should pick topics.**
- **US and Canada relations**
- **More things to do with technology**
- **Maybe teach how to use all the programs that the school has**
- **More computer-related.**
- **I think we should focus on things in our community**
- **More searching and e-mail and msn**
- **International communication**
- **You should explore topics that affect people's everyday lives.**
- **Chatting & more videoconference.**
- **Not too sure at the time**
- **More gaming, and lots of multimedia-type activities (e.g. flash, Photoshop, etc....)**
- **Something about legalization of marijuana**
- **More conferences and long distant meetings with student to student meetings**
- **Playing games with students from other cities via the net.**
- **Expanding the global classroom idea to other subjects, to make things more interesting, and easier on everyone**
- **Interesting ones**

Question 18: Please use the space below to add any other comments that you might have.

- **I love this class I hope to be in it next year.**
- **I would suggest that everyone at least looks into the benefits of this course whether they are a student or a teacher.**
- **Excellent so far.**
- **Great class... See you next year**
- **I'm really going to miss this class and all of the wonderful people in it. What can I say....summer conferences were GREAT, and doing projects and presentations the night before they're 'due' was the best. Thanks for all the memories and learning experiences. It's been a blast!**
- **I loved it! I loved it! I loved it! One of the most meaningful classes of my three years of high school!**

- I think it would be a good idea to test using this program in the other classes like Social, Math, Science and English
- I like the class because it was fun and maybe I will take it again.
- Great class.
- I like this class
- I love this class and want to take it next year
- More fun (although it is already really fun it could be more fun) :)
- You should have more teachers like Mr. Summer.
- I liked this course
- I think that this was a great experience to be able to do this.
- It was a very good experience. We learned a lot and had fun in the process
- Thank you for giving me the opportunity to communicate with other students from around Canada.
- It was a good learning experience
- This experience was very informative and all students should be able to experience interaction with other students across the country.
- It seemed the people in Ottawa were way more prepared than we were.
- I hope that I can do this again sometime
- I like using technology to communicate ideas and beliefs across to people in different places. I think it's great to see this combination put to work.
- This is cool because we can go to many different places and communicate with the people from there and see new things.

Appendix B

Embrace Space Event

Embrace Space Day- is a massive grassroots effort with events taking place across the U.S. and throughout Canada. It is celebrated each year on the first Thursday in May and is co-chaired by former Senator and astronaut John Glenn. This celebration is dedicated to the extraordinary achievements, benefits and opportunities in the exploration and use of space.

The goal of Space Day is to advance science, math and technology education and to inspire young people to realize the vision of our space pioneers. This year's theme is "Adventure to Mars" and will focus youth's attention on expanding our scientific frontiers to one of Earth's nearest planetary neighbors. Being the only planet in our solar system that has the potential for human inhabitance, Mars is known as the planet that most captivates kid's interest and imagination.

On Thursday, May 2, 2002 J. Percy Page was pleased to host the Embrace Space TeleLearning event for grade 6 students and teachers from Meyonohk School. This exciting learning opportunity involved connecting our students to experts at the Canadian Space Agency as well as several other student groups from across Canada. We used real-time videoconferencing over high-speed research networks to do this. The Communications Research Centre in Ottawa facilitated the event. Participants included:

- Meyonohk School,Edmonton, Alberta,
- Queen Mary Public school Peterborough, Ontario
- Barrhaven Public School, Nepean, Ontario
- Fielding Drive Public School, Ottawa, Ontario
- Glen Cairn Public School, Kanata, Ontario
- Bridlewood Community E.S., Kanata, Ontario
- Conseil Commission Scolaire au Coeur-des-Vallees, Buckinham Quebec
- Ecole Hamelin, Wotton, Québec
- Sainte-Agathe Academy, Sainte-Agathe-des-Monts, Québec
- Mary Queen of Peace Elementary.St. John's, NF

Dr. Alain Berinstain, Canadian Space Agency Project Manager for the Mars project, gave an excellent (highly interesting) presentation. His presentation included rare images of the planet Mars. Students at all sites participated in brainstorming sessions, question and answer sessions and then had an opportunity to share the information that they had learned. There was no doubt that all participants left the event with a much greater knowledge of the planet and the issues surrounding the colonization of Mars. As Dr. Berinstain said, "it is very possible that one of these participants will be directly involved in the colonization of Mars project."

Broadband Enabled Learning in Action!

The TeleLearning Centre @ J. Percy Page

Calendar of Events

March Events

March 11

Social / Legal Studies: ***Broadband Mock Trial*** **8:30-10:00am MST**

Students at Middlefield High school in Toronto, the Legal Studies class from J. Percy Page, and Lawyer Tricia Chrzanowski from McLennan-Ross will simulate a real trial experience with prosecution and defense. Students will prepare arguments and interview witnesses across the country. Ms. Chrzanowski will be acting as our judge.

March 11

U.K. Teacher Conference 9:30 am MST / 11:30 EST / 4:30 pm UK

Karen Andrews and teachers from J Percy Page will share their work with using videoconferencing in the classroom with teachers from the Scotland. This will be the first in a series of connections to the UK.

Date TBD

Science: ***Manipulation of Human DNA***

Students and science teachers from J. Percy Page will explore the complex curricular topic of DNA replication for medical and legal purposes. Classes will be linked to peer in the Toronto District School Board, York Region schools, and experts from the Ontario Science Centre.

March 22

Math: MC^2 ***Math Improv!*** **11:30 – 12:30 MST**

Ursula Franklin and J. Percy Page students will connect to exchange math problems and solutions. Students will view a new on-line environment for the exchanging of materials.

March 24

Social Studies: ***Charter Challenge*** **8:30 – 9:45 MST**

Middlefield School (Toronto) and J Percy Page will participate in this Videoconference (along with Holy Heart HS from St. John's, NF and Ottawa).

This is a joint project with The Education Network of Ontario and the Ontario Bar Association as part of the 2004 Law Day Program. The Charter Challenge is an online simulation for High School students across Canada. It has been created to help students gain a better understanding of the Canadian Charter of Rights and Freedoms. It involves students in a collaborative, decision-making situation based on a real-world scenario. Activities are tied directly to provincial curricula. The target audience is High School students in Grades 9-12.

March 25th

PD: ***U.K. – CANADA Teacher Conference*** **9:30 – 11 am MST**

Educators from across Canada and Scotland will discuss ways that both countries are moving forward in the implementation of information technologies in schools. We will discuss barriers to implementation (how they have been overcome) and the impact of using IT in the classroom. The session will start with a brief overview of both educational systems.

April Events

April 7 **Social Studies:** ***Guest Speaker – Kevin Taft***

Students and social studies teachers will link with Calgary schools and the Galileo Educational Network to discuss a variety of issues in Alberta politics with Kevin Taft.

Date TBD **Arts/ Multi-media:** ***Communicating Through Multimedia***

Page students and multimedia teachers will team up with Victoria School for the Performing Arts and The Banff Centre new media institute (BNMi) to discuss the creation of quality new media. Judges, including the truly inspirational Sara Diamond, from the Banff Centre will view and provide feedback on student work.

Date TBD **Social Studies/ Black History:** ***Using Science to Eliminate Racism***

Students from Ursula Franklin Academy in Toronto and J. Percy Page in will connect to scientists at the Ontario Science Centre to discuss recent scientific theory that changes our concept of race.

April 23 **Math:** ***MC^2*** ***Math Improv!***

Students will present high level math problems to each other and work cooperatively to solve them.
Linked to Seneca College, Toronto, Galileo Educational Network and Ursula Franklin Academy, Toronto

May Events

May 5 ***Presentation at ECOO Conference in Ontario via Videoconference***

Teachers from the TeleLearning Centre will provide a 30 minute overview of how to set up collaborative projects using videoconferencing. This presentation will be broadcast live to participants at the international ECOO conference in Ontario. Local participants will continue the discussion after the presentation.

Science/Social/ Legal Studies: ***The Ethics of Nano-Science***

Guest Speaker –Dr. Linda Polarski and participants from Galileo, Toronto District School Board, York Region and JPP.

TeleLearning Centre Grand Opening (May 27th)

This really big event will feature a series of TeleLearning events for a variety of grade levels and subject areas coupled with tours, music, food and multimedia presentations.

June Events

Space series: Interactive sessions with Astronauts and Scientists at the Canadian Space Agency
Sessions will be adapted for students in grades 6-12.

Appendix C

VIDEOCONFERENCING CLASSROOM OBSERVATION TOOL

Directions: Observe what students are doing, the work they have produced or are engaged in producing and what the classroom environment looks like. Select one of these areas and write out your comments. **CLASSROOM ENVIRONMENT**	✓ **COMMENTS (evidence of instructional practice)**
• The importance of learning is communicated as a classroom goal.	
• A climate of inquiry and openness to creative solutions is created.	
• Teacher and students can hear and see each other clearly and there are no technical barriers to learning.	
• Tasks demonstrate challenge, clarity, authenticity and alignment with curriculum.	
• Teacher/speaker questioning and response behaviours stimulate student thinking.	
• Feedback is evident in terms of checking for understanding through probing and clarifying questions.	
• Multiple, varied, and stimulating resources at students instructional levels are available.	
• Environment and instruction provide for interactivity and activity.	
• Engagement in interactive/collaborative instruction (variety of whole class, small group and individual instruction) occurs to build a community of learners.	
• Students are actively engaged during the lesson.	
FACILITATING LEARNING	
• Curriculum goals are clear in terms of what students are expected to learn from the lesson or assignment.	
• Learning tasks are challenging to students, requiring them to analyze, predict, synthesize and draw conclusions.	
• Guided teaching, structures information in steps, linking to and building on prior knowledge, and balancing direct and indirect teaching experiences (uses advance organizers, modeling, demonstrations, visuals, hands-on activity, online supports, media, etc.).	
• Opportunities to make learning meaningful are available (present and manipulate information, experiment pose/solve problems, research, connect to real-world places/people/experts and apply ideas).	
• Evidence of differentiated instruction and assignments is apparent. Content and resources are matched to learner level.	
STUDENT AS PARTNERS IN LEARNING	
• Students are encouraged to explain what they are learning and why, and to think about their thought processes and strategies.	
• Assessment criteria are clear, explicit, and aligned to task and curriculum. (rubrics, check-lists, etc.)	
• Students are reminded of behaviour expectations and are expected to collaborate, share and contribute ideas.	
• Control is delegated to students to self-initiate and reflect on their learning. (Where it fits, choices in process or tool)	
• Models of work are displayed or demonstrated to illustrate performance standards. (online or on walls, etc.)	
• Students can articulate how skills and products meet or exceed standards. (Self-assessment, peer feedback)	

Adapted by Karen Andrews and Dee Elder from: Costa, A., Developing Minds, ASCD, 2001; Cawelti, G., Handbook of Research on Improving Student Achievement 2nd Edition, Educational Research Service, 1999; Marzano, R.J. et al., Classroom Instruction That Works. ASCD, 2001; Marzano, R.J., What Works in Schools, Translating Research into Action. ASCD 2003.

Appendix D

Background

Student learning is improved through video-conferencing technology by:

- connecting several classrooms from different places or to a single teaching location;
- expanding access to outside experts and learning opportunities beyond the traditional classroom environment, or making interactive virtual fieldtrips possible;
- enabling access to international learning experiences and events which develop cultural awareness and global perspectives; and
- providing unique educational services to students with special needs.

Video-conferencing technology supports teachers by:

- offering professional development opportunities with content experts that otherwise would not be possible;
- creating mentoring opportunities between educators in different locations and facilitating the development of professional learning communities; and
- connecting EPS classrooms to classrooms across Alberta and Canada, working with their students to find innovative ways to enhance learning.

Video-conferencing in Edmonton Public Schools:

There are currently 7 district schools involved to varying degrees with video-conferencing. J. Percy Page, Centre High and Victoria School of Performing Arts have been using video-conferencing technology since 2002 for staff professional development and to extend learning opportunities for students.

In May 2004, an invitation was extended via Superintendent's Memo to all schools interested in joining the video-conferencing community for the 2004-05 school year. Four new schools joined the EPS video-conferencing community and have participated in a number of events hosted by the original ABEL schools. Each of the four schools have developed an Implementation Plan and are awaiting connection to the SuperNet before purchasing equipment of their own.

District Technology will provide the leadership to continue/expand the EPS ABEL videoconferencing initiative for 2005-06. ABEL began as a national project with shared funding from the CANARIE learning program (an agency of Industry Canada) and project partners. The CANARIE initiative ran from September 2002 until January 2004.

ABEL involves a learning community of over 300 educators in K-12 and post secondary institutions in Ontario and Alberta. Educational partners include York University (lead), University of Alberta, University of Calgary (Galileo Educational Network), Seneca Collage, Toronto District School Board, York Region District School Board, The Banff

Centre and Edmonton Public Schools. At the conclusion of the project, all participants decided to continue to work together and expand the professional learning community.

> ***The Advanced Broadband Enabled Learning (ABEL) Project is a technology-mediated professional learning program that engages a new culture for teaching and learning through the use of broadband networks and information communications technology.***

The ABEL model is comprised of three main components:

1. **Online Learning Environments:**
   ABEL www.abelearn.ca **VCALBERTA** www.vcalberta.ca
   The online environment facilitates learning by connecting students and teachers to research, tools and inquiry-based collaborative projects. Teachers, students and experts are part of a learning community that exchanges resources, ideas and expertise anywhere and at anytime. The online environment keeps people and institutions connected during, and between, professional development activities that occur via videoconferencing. Educators use the online environment to share resources, participate in discussions and plan/book videoconferences. The environment combines broadband applications (videoconferencing, video streaming) with internet resources (collections, management systems).

2. **Professional Learning Program**
   The ABEL professional development program is job-embedded, accredited by the post-secondary partners, reflective, and teacher driven. The program has the teacher/faculty working collaboratively with students in the classroom while engaged in professional learning. The program is focused on improving student learning.

3. **Research and Evaluation**
   This component of ABEL measures the success of the implementation and the impact on the teacher/faculty and student learning.

ABEL Activities: What is Possible in the ABEL Learning Community?
Through a broadband network, ABEL connects experts, teachers and students from across Canada in a collaborative learning environment. ABEL teachers (K-12, postsecondary faculty and pre-service teachers) participate in a variety of professional learning activities and work with their students to find innovative ways to enhance classroom learning.

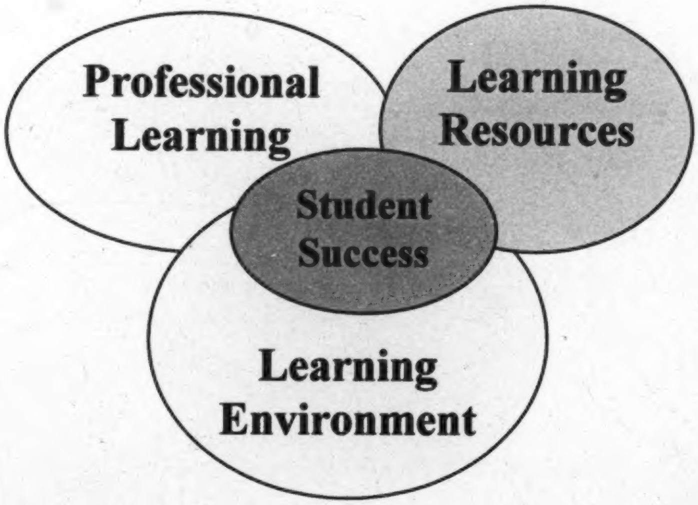
The ABEL environment includes technology tools and resources to support teaching and learning such as:

- Learning management tools (learning content management systems, WebCT, IO)
- Digital Content (learning objects, streamed videos, teacher posted resources)
- Videoconferencing (MCU booking, calendar of events, applications)
- Collaboration tools (online community, shared applications)

Professional learning activities
ABEL teachers:

- Participate in a combination of face-to-face and broadband enabled professional learning programs. Synchronous events and asynchronous activities

- Collaborate and share experiences and practices with peers and experts
- Develop ICT skills/competencies and teaching and learning strategies
- Manage and assess student learning in technology-mediated environment
- Complete Masters degree qualifications (optional)
- Organize videoconferences for collaboration in joint projects among classes and students
- Experiment with new ways to integrate e-learning with conventional learning activities



Benefits and Results - ABEL

@bel
plug into learning

Evaluation Results

An external evaluation team from York University monitored the implementation and results of ABEL. The team summarized that,

> ***Teachers have begun implementing broadband technologies in their practice in ways that are breaking through the bounds of traditional pedagogies, offering their students more authentic and engaging learning experiences.*** *ABEL First Interim Research Report, July 2003*

The districts' experience within ABEL supports the Interim Research Report. District teachers/ administrators are using the model to bring new resources and expertise into their classrooms as well as to collaborate and share best practice with others. Our teachers express enthusiasm in being part of a technology-mediated educational community.

> ***We are changing schools. We are changing education as it can be delivered to our students –in a way that is more meaningful and relevant. That is an amazing task.***
> *-EPS Teacher*

EPS participants receive the job-embedded support that they need (from highly qualified experts/researchers) for professional learning and technology integration. This results in a greater likelihood that new resources, research-based methods and new technologies will be meaningfully implemented in the classroom.

Student Achievement
EPS teachers report a positive impact on student achievement as a result of their ABEL work. A math department head reported that she "got the best student work and results from pure math 30 students" that she has ever witnessed in her career. Her students' diploma exam results were 7% higher then previous years. She accredits the high achievement results to improved student engagement with math as a result of her collaboration with other teachers and researchers from Galileo, bringing in Mathematicians (through videoconferencing) from the U of A and U of C, and the use of quality digital learning objects developed through ABEL.

> ***Student learning is positively impacted as they experience a real-world connection within the subject area. Students report a higher level of engagement with the subject matter and an increased understanding.*** *–EPS Teacher*

Our principals are pleased with the collaboration opportunities and learning advancements that have taken place within our three ABEL sites. In APPENDIX A the three EPS schools share their thoughts and experiences in using the ABEL model to support teaching and learning.

ABEL has received awards of excellence:

- *Showcase Ontario Award for Excellence in Working Together, Sept 2003*
- *The Learning Partnership Technology Innovation Award, June 2003*
- *SchoolNet Network of Innovative Schools Award to J. Percy Page, Oct 2003*

Teacher Best Practices

Making effective use of videoconferencing is a matter of imagination and changing habits – thinking outside of the normal classroom or professional development practice. What meaningful curricular connections would you like to provide for your students? How do you want to collaborate with others? There is a world of opportunities at your fingertips. Here are just a few examples of how teachers have used videoconferencing to provide engaging learning opportunities for students:

► Remember – Videoconferencing is participant driven. The success of videoconferencing depends on the imagination and innovation of participants.

Dream Big!

◊ Social Studies:
Gwynne Dyer, broadcaster and journalist presents his thoughts to senior high students on the invasion of Iraq and U.S. foreign policy. This was part of a Senior High Social Studies program and over 400 students attended the event at Victoria School in Edmonton and Huron Heights in Toronto.

> Students asked insightful questions and teachers developed a video resource as a result of the session. This presentation was well received by the students at Victoria School and by the students at Huron Heights. It was a landmark event for the ABEL team because we had to work as team to deal with stage management, equipment placement and production of the event.

◇ **Math:**

MC^2 (Math Cooperative amongst Countries) – Students meet on a regular basis to exchange challenging math questions and to develop solutions. Students present problems from each site, have the opportunity to ask experts clarifying questions and then present various solutions to the problems. Students have access to a website where they are able to post additional problems and solutions between event dates.

> Students have found the events to be challenging, but enjoy them so much that they are attending during their lunch hours to accommodate the time difference between Alberta and Ontario. Students see the use of videoconferencing as "something totally different" and "a unique and interesting way to learn math.

◇ **Science:**

DNA Replication with the Ontario Science Centre (OSC) – Edmonton Public students connected to genetic fingerprinting experts in the actual DNA lab at the OSC. Students observed the complex process of DNA replication and got to see their own DNA images from hair samples sent to the OSC. These same students also interacted with crime scene scientists at Canada's main Crime Lab and connected to Dr. Keith Bagnal for a fascinating look at fetal development.

◇ We have had a number of successful videoconferencing projects in almost every subject area and we have used the technology extensively for professional development. Here are a few more examples:

- Kyoto Protocol - debated by Alberta, Ontario and Quebec students
- Renowned artist Robert Bateman teaching a grade 5 art class
- Holocaust Symposium - the symposium was designed to give students the opportunity to hear first hand about the experiences of those who lived and survived the Holocaust. It also permitted students at various schools across Canada to ask questions and interact with the speaker.
- HIV/AIDS (UN AIDS Awareness Day)
- Elimination of Racism Event
- Second Language and Cultural events with schools across the ocean
- Math Speakers Series (Professional Development for math teachers with John Mighton, the author of "Myth of Ability")

Keys to Success

The goal of videoconferencing is to support teaching and learning through providing access to a vast wealth of innovative learning opportunities. We have learned that making connections to other people (peers, experts) is the #1 reason that schools desire the technology. A key factor in the success of this program involves participation in the learning community. The more you network, the more you learn. Here are a few suggestions for making connections and sustaining your program:

☐ Attend training and networking opportunities:

- Summer Institutes
- Videoconferences
- Workshops
- Demonstrations and special events

☐ Access the online communities often: Daily if possible (make it your home page)

- Post project ideas, start a discussion, contribute to a project idea, check out the events calendar, contact the subject area coordinator. Be an active member. Use the community rather then email.

☐ Have regular site meetings and information sessions for your staff

- Share ideas and help each other to implement the technology into a variety of subject areas. Form a team of leaders/mentors that can help others. Print off activity updates and follow-ups for staff members.
- Meet with centre coordinator to share what's going on in all sites and work on any challenges.
- Involve member/s of the school administration

☐ Videoconferencing Venue

- An office or conference room for small groups and PD sessions; a classroom for student events. Often schools will require a large venue for events with special quests (library).
- The rooms should be selected with lighting and sound considerations in mind. Can you control the lights? The screen needs to be dark while the participants need to have light.
- The locations need to be close to the main wiring closet and have the required network access.

☐ Get your school Technical Support person involved

- School technical support is critical. Support person should attend meetings and training opportunities. Make sure several people know how to use the technology and have the contact information for each session.

☐ Promote it. Take pictures/video clips during sessions. Talk about videoconferences in your school newsletter, at Student led conferences, assemblies, and at your Open House. Put up posters and updates.

☐ Support the innovators.

- Using any new technology takes time and perseverance. Staff members will need time built into their day to learn to use this technology and to collaborate. Schools have facilitated this in different ways; supply coverage reduced teaching load, early dismissal Thursdays, PD Days, collaborative time, flexible timetable.

Roles & Responsibilities

School Administration:

- Have initial meeting with Lead Teacher/s and Central Videoconferencing Coordinator
- Complete the Implementation Plan (pg 10-15) for your school and set up site visit
- Promote and support the use of videoconferencing by staff (admin, teachers and tech support)

- Meet with Central Coordinator periodically
- Be aware of videoconferencing activities
- Participate in Summer Institute
- Facilitate appropriate location/s for the videoconferencing environment
- Support staff through release time/ flexible timetable
- Support technical provisions

Lead Teacher:

- Meet with Principal and Central Coordinator
- Attend district training session/s and Summer Institute
- Use the videoconferencing
- Assist with environment creation/set up
- Participate in/lead PD sessions
- Facilitate staff training
- Hold regular meetings with the videoconferencing team and Coordinator

Teachers:

- Attend a district or school training session
- Use the videoconferencing online environments
- Promote and facilitate videoconferencing
- Access to a computer in their classroom
- Familiar with Internet Explorer browser and the internet

School Technical Support:

- Attend a district training session
  Perform technical tasks:
    - Set up and testing of environment
    - Support users
    - Maintain equipment
- Promote and facilitate videoconferencing

District Technology:

- Facilitate access to ABEL and VCALBERTA communities
- Connect participating schools to resources and experts, including event organization
- Provide central training and PD to teachers, administrators and technical support personnel
- Organize PD opportunities such as the Summer Institute
- Support and facilitate the process of connecting schools to the SuperNet
- Coordinate reporting to Alberta Education to ensure expenditures meet funding criteria

Implementation Plan

Section A - Background

To ensure a successful implementation of Videoconferencing at your school, please indicate your plans to meet the following items. It would be helpful to reference the *Roles and Responsibilities* and *Keys to Success* sections.

Name of school:

1. **Why do you want videoconferencing in your school and how will it support your instructional focus work?**

2. **Plans for use (what ideas/plans do you have for implementing videoconferencing projects/ program in your school?):**

3. **School Videoconferencing Environment (what space or room in your school will you use to videoconference). Describe location(s):**

4. Team Building (how will you build your team?):

5. Team Support (how will you provide time/support to enable participation by team members?):

6. Technical Support (how will you provide technical support?):

7. Technical Information - Please describe your level of connectivity (cable modem, SuperNet, T1, Fibre LAN, etc.):

Section B - Building a Videoconferencing Team

To ensure a successful implementation of videoconferencing at your school, please give some thought to the following components of your implementation plan.

Choose staff that can lead the school implementation of Videoconference. Experience has shown that the most successful schools have strong enthusiastic leadership.

▶ **Considerations**:

- Phased implementation - start with a small team consisting of an administrator and a few teachers or department heads.
- Assign a lead person as the key contact and organizer (Site Lead).
- Identify school goals for usage by teachers: Is videoconferencing part of your technology or Instructional Focus plan?

1. Lead Staff Member/s:

Lead Member/s Name	School Role

☐ Attend a district information session on May 5th 1:00 p.m. Lab B, EPS
☐ Facilitate videoconferencing team at school (teachers, tech support)
☐ Act as key contact for central coordinator
☐ Attend Summer Institute /workshop
☐ Facilitate site meetings

Notes:

2. Technical Support:

Technical Support Person's Name	Full or Part time?

☐ Attend a district information session – schedule TBA
☐ Support videoconferencing team at school (tech support)

Notes:

Section C - Technology Requirements

Videoconferencing equipment: In consultation with the District Technology consultant, schools will select the VC equipment that is the best match to their VC plan.

The following units are recommended for use in Alberta:

- **Polycom VSX 7800 (Multi Host Session)** – This system includes a built-in MCU, which can connect up to three remote sites. It has a camera and microphones and an excellent sound system (14 khz), which offers crisp, clear sound. It also includes another unit called the Visual Concert. This unit allows you to share documents and presentations during sessions. Currently, the quote for the VSX 7800 is $9031.
- **Polycom VSX7000 (Single Host Session)** - This unit is used for a point to point videoconferencing. It has a camera and microphones and a sound system (14 khz). It offers flexibility and expandability in offering the option to add additional displays, microphones and speakers. Currently the quote for this unit is $5430.

Network infrastructure: Based on school/program needs. Network will be assessed during the site visit.

Site Technical Visit notes (leave blank):

Section D - Budget

*** School budget to be determined after consultation and site visit**

Item	**Cost**	**Total**
Videoconferencing Equipment		
Network Upgrades (if required)		
Additional Technical Support (if required)		
Teacher Support (eg. release time, flex schedule)		
Summer Institute Matching Grant		up to $7500
Total		0

APPENDIX: Summary of Video-Conferencing Activities, 2002-04

A. Victoria School for Performing and Visual Arts

The ABEL Project commenced at Victoria School of Performing and Visual Arts in September 2002, and has acted as a catalyst for collaboration and professional development within the school. From the outset, six staff members were willing participants in the project which integrates broadband technology with learning and best teaching practices. Staff was selected from the following areas: arts, social sciences, sciences, design and new media.

The opportunity for interdisciplinary work and team building has been unique. The project has brought staff together to work on integrated projects and cross-curricula ventures with students. It has also been instrumental in providing professional growth for teachers in the area of technology and communication. The use of videoconferencing and an array of leading edge broadband online learning tools has benefited staff and students alike.

The six team members at Victoria School have participated in online projects with other schools and external agencies. This work has included collaborative ventures with teachers and students in Toronto and in York Region. One highlight was a live link up between Victoria School and the Ontario Science Centre on a DNA experiment that is part of the Biology 30 curriculum.

As part of a larger group in the online community, Victoria staff have also worked with staff at York University, the University of Alberta, and the Banff Centre, as well as other partners in the project. More information can be found at http://www.abelearn.ca/

The team at Victoria School looks forward to further involvement in ABEL depending on support and funding allocations from various stakeholders. We would particularly like to thank Karen Andrews and District Technology for their support and leadership in this project. In addition, the teaching staff would also like to recognize the ongoing and full support of Principal Ingrid Neitsch with this exciting leading-edge venture.

Andrew Gambier
Lead Teacher, ABEL Project
Victoria School of Performing and Visual Arts

B. Centre High Campus (CHC)

> ***ABEL is learning at the speed of light. Broadband collaboration for teachers and learning events for students provides a 21st Century opportunity for classrooms and lessons that were designed in the 20th Century or earlier.***
> *– Glenn Iriye, CHC ABEL Site Coordinator*

ABEL was showcased at an event at J Percy Page in June of 2002. The framework of collaborative planning and pushing the limits of both geography and technology were too tantalizing a prospect for CHC staff. As a result, three teaching staff volunteered to participate in the summer training session held at Seneca College in August of 2002.

Our expectation was, and continues to be simple: incorporate the use of technology to enhance student learning. To this end, we have used videoconferences as planning sessions for teachers and as learning events for students. Participation in ABEL has allowed us to draw upon expertise from educators to address specific topics and general procedures in subject areas. We have sought out technical advice from one of the best technical support teams available in Canada.

ABEL has supported student concept development through making leading figures available to students, where students might not otherwise have had the opportunity to listen to or question Canada's representative for peace to the United Nations, or to a well respected research doctor to examine and discuss the implications of SARS and BSE.

Multidisciplinary planning, implementing, and evaluation of ABEL events have strengthened professional development of the staff involved. For example, Rohit Kapoor, a math teacher, become involved in the planning, implementation, and evaluation of Sam Filice's social studies project dedicated to peace education. From his involvement with this event, Mr. Kapoor was able to identify implications for his math students in incorporating relevant math skills with current events.

ABEL has permitted the Centre High team to focus on the learning process and dwell upon the implications of the ABEL elements to be incorporated into our "regular" lessons. For example, October's large group videoconference posed a basic question of learning: What are five characteristics of an engaging, interactive classroom? The teachers, researchers, and administrators ABEL sites were provided with readings and time to share their ideas at their site prior to the conference. The large group videoconference then provided the opportunity to further examine the question and to see if the characteristics are present or planned for during ABEL videoconference events for students. Such opportunities allow us to thoughtfully reflect upon our experiences and share them in a meaningful manner.

> ***Brings life to the curriculum.*** *– Stacy, CHC student*
> ***...brings meaning to what I'm studying.*** *– Kyle, CHC student*
> ***Neat! This is really different.*** *– Sean, CHC student*

Centre High Campus is supportive of all the efforts of the district to ensure our students and staff have access to leading edge opportunities to support learning. CHC is also appreciative of the work of Karen Andrews, ABEL Project Coordinator, and EPS district technology for making an initiative such as this a success. Across the city and across provincial boundaries, ABEL has proven to be a worthwhile endeavour.

Ray Cimolini
Principal
Centre High Campus

C. J. Percy Page School

J. Percy Page is very proud to have been at the leading edge in the use of broadband connectivity to enrich student learning, as well as to provide meaningful and effective professional development for its teachers. Through our partnership with Shaw Communications and our previous participation in the Learn Canada Project, a number of students and staff, prior to the ABEL Project, *had already developed considerable comfort and expertise with teleconferencing and collaboration over broadband, as well as in using this technology to plan and conduct student project work within different curricular areas.*

The teachers at J. Percy jumped at the chance to participate in ABEL and have been heavily involved in the project from the beginning. Karen Andrews is the Learning Lead for the project and there are six J. Percy Page teachers involved in ABEL The curricular areas include Math, Science, Social Studies, the Arts, and Legal Studies. Throughout the project, these teachers have:

- Participated in a number of videoconferences, where they have been introduced to new technologies, listened to experts, and discussed teaching methodologies with colleagues across the country.
- Developed relationships with project teachers in other schools, shared information with these teachers, and jointly planned and conducted projects or other learning experiences with their students.
- Become familiar with a variety of technology with which to enrich their instruction, including online course creation in WebCT, web page creation, inquiry-based project development in IO, streamed video, electronic learning repositories, and several others.
- Created learning materials and developed strategies which they will be able to continue to use effectively even after the project has ended.

The most powerful result of this has been a significant shift in how both the teachers and the students involved view school, as well as how teachers view professional development. The usual limits of space, time and money are no longer such a problem. The classroom can essentially be extended to anywhere in the world. Students can gain first-hand information from experts, ask questions of them, and discuss important topics with other students anywhere. Both teachers and students can establish "virtual learning communities" that are not restricted by geography. Teachers can help each other to develop their skills, in matters that are of immediate concern or relevance, and in ways that will help them to share their workloads and provide more effective ways for their students to learn. This has the potential to fundamentally change the roles of teachers and students in the learning process.

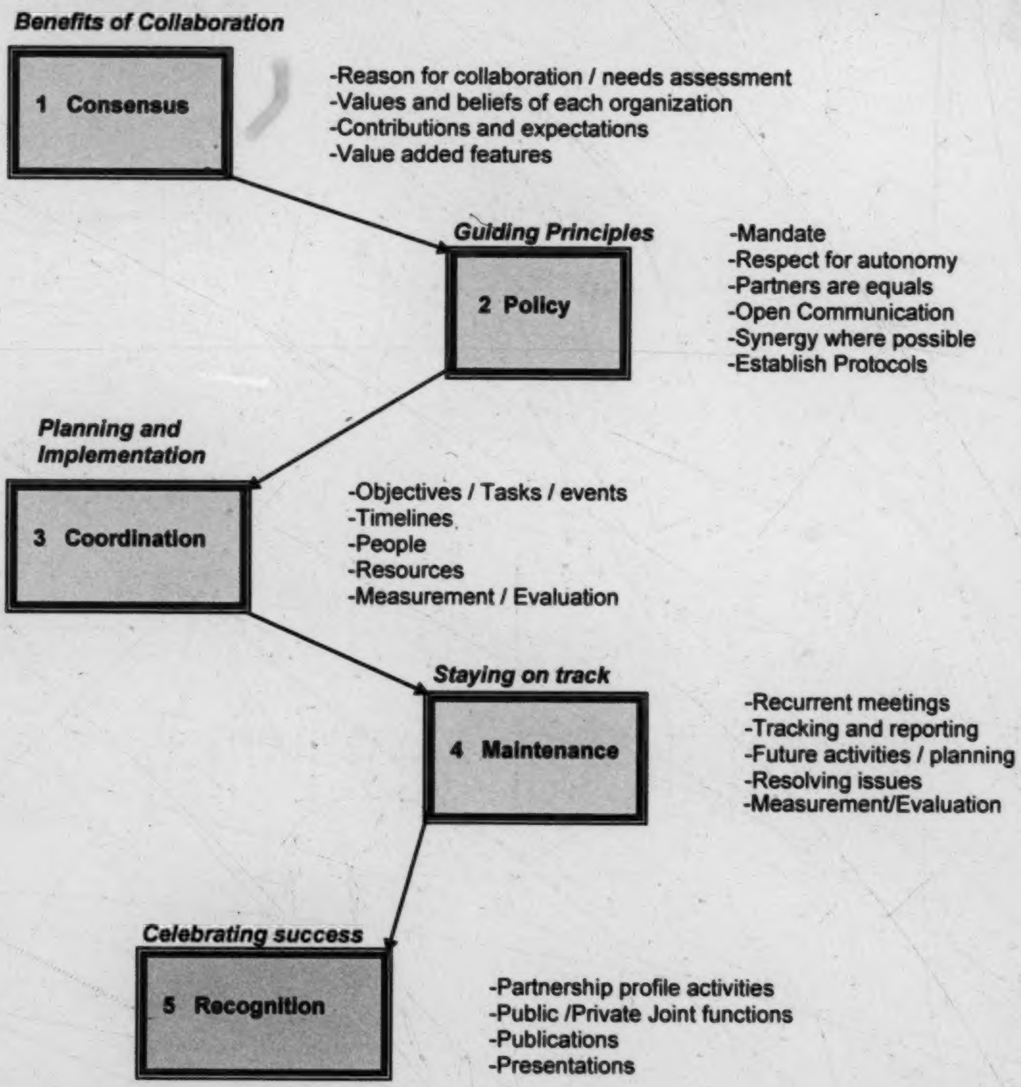
Geoff Buxton
J. Percy Page ABEL Site Lead
Department Head, Science and Technology

Appendix E

J. Percy Page School SHAW)

Collaborative Partnerships Model

The Collaborative Partnerships Model provides a suggested framework for collaborative activities between educational partners and non-educational partners. This model is centered on providing mutual consideration and understanding of the unique natures, contributions, and expectations of each partner.



Benefits of Collaboration

1 Consensus

-Reason for collaboration / needs assessment
-Values and beliefs of each organization
-Contributions and expectations
-Value added features

Guiding Principles

2 Policy

-Mandate
-Respect for autonomy
-Partners are equals
-Open Communication
-Synergy where possible
-Establish Protocols

Planning and Implementation

3 Coordination

-Objectives / Tasks / events
-Timelines
-People
-Resources
-Measurement / Evaluation

Staying on track

4 Maintenance

-Recurrent meetings
-Tracking and reporting
-Future activities / planning
-Resolving issues
-Measurement/Evaluation

Celebrating success

5 Recognition

-Partnership profile activities
-Public /Private Joint functions
-Publications
-Presentations

Interconnections: This model can be used to create a Memorandum of Understanding (MOU) between partners. The MOU would highlight the agreed upon specifics within each of the 5 main areas.

you make the differ

Appendix F

Videoconferencing Collaborative Project Outline DATE:

Project Name:

Subject / Class:

Lead Teacher Name:

Lead Location:

Project Lead Contact Information (Name, phone numbers and email):

Technical Lead Contact Information:

Description of Project:

Event (final product) Date:

Time required to prepare project:

Time required to deliver project:

Site Information (lead name / phone/ site name / room number / IP address):

1.

2.

3.

4.

Number of Students (by location) involved:

Experts involved:

Guests:

Tools / Resources required:

Event Planning Meeting Dates:

Documents / Presentation materials:

Technical Test date:

Technology Notes:

Workplan:		
Date & Time	**Task**	**Assigned to:**

Event Procedure:

1. **Project Lead: Complete project outline**
    - i. **Provide enough lead time to ensure a successful event**
    - ii. **Book MCU if this is a multi-site session**
    - iii. **Post event on an online community or send email to participants**
    - iv. **Add event to Calendar –make sure to include event times**
    - v. **Complete, and post/send project outline and materials**

2. **Project Participants:**
    - i. **Contact project leader**
    - ii. **Complete participant information in the Project outline.**

Planning Check list (Procedures):

- ✓ **MCU has been booked (if needed)**
- ✓ **Project Outline posted /sent to participants**
- ✓ **Participants have been confirmed and planning meeting set.**
- ✓ **Curricular objectives and session protocols sent and confirmed**
- ✓ **Testing date set. Date and Time:**
- ✓ **Room and equipment booked**
- ✓ **Technical support booked**
- ✓ **Agenda posted / sent by email**
- ✓ **Pre/Post event materials and evaluation form sent**

EVALUATION FORM **Videoconferencing Session**

Date, class and Location: ______________________________

Please take a few minutes to answer the questions below. We are committed to making continuous improvements.

1. Participant information (check one as appropriate):

☑	Name of Class, School or Organization	☑	Name of Class, School or Organization
		-	Other (specify):

2. The videoconference was a successful learning experience.

☐ Strongly Agree ☐ Agree ☐ Disagree

3. Please rate the following related to this event:

How satisfied were you:	Very Satisfied	Satisfied	Somewhat Satisfied	Not Satisfied	Not sure
With the usefulness and relevancy of the information provided?					
With the quality of the materials provided?					
With the knowledge and communication skills of the speakers?					
With the opportunities for discussion and interaction?					
With the overall (non-technical) quality of the session?					
With the technical quality of the session?					

4. Please rate the following related to the sessions:

How satisfied were you with the following parts of the session:	Very Satisfied	Satisfied	Somewhat Satisfied	Not Satisfied	N/A
Introduction, Overview of agenda and protocols. Practice session. (9:30 am)					
Guest speaker presentation (10:00 a.m.)					
Question period (10:20 p.m.)					
Breakout group activity (10:40 a.m.)					
Reporting back –mini-presentations (11:30 pm)					
Summary of what we learned today (12:00)					

5. Are you interested in participating in future videoconferencing opportunities? YES NO
   Please indicate a reason for your answer:

6. What is one aspect of today's event that you enjoyed the best?

7. What is one thing that you learned as a result of participating in this session?

8. What is one aspect of today's event that could be improved for the next event?

9. Do you have any additional comments or suggestions regarding today's event?

Appendix G

TeleLearning at J. Percy Page
Video on CD-ROM

3.5 minutes